January 1983
vol 9, no 1
$2.95

creative computing®

the #1 magazine of computer applications and software

Focus On Computer Graphics

In-depth Reviews:

- Franklin Ace 1000
- Commodore 64
- Ada Compilers
- Apple Graphics Utilities
- Speedread+
- E-Z Learner
- Amdek RGB Monitor
- 13 Apple Games
- Aeronaut
- Cypher Bowl
- Ceemac
- Krazy Antiks

How to do 3-D Stereo Graphics

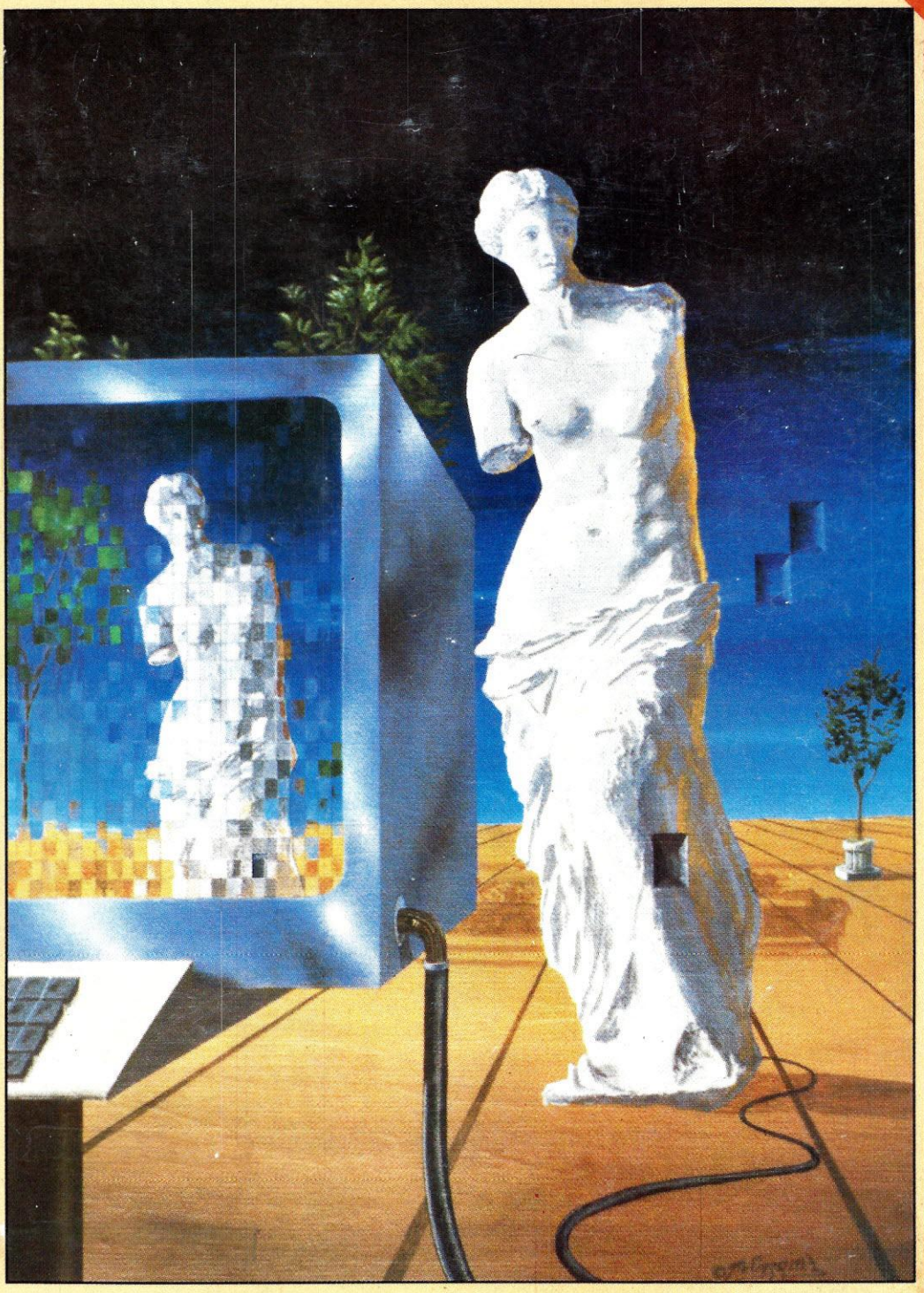
MX-80 Graphics With Pascal

TRS-80 Graphics Made Easy

Is Computer Art Really Art?

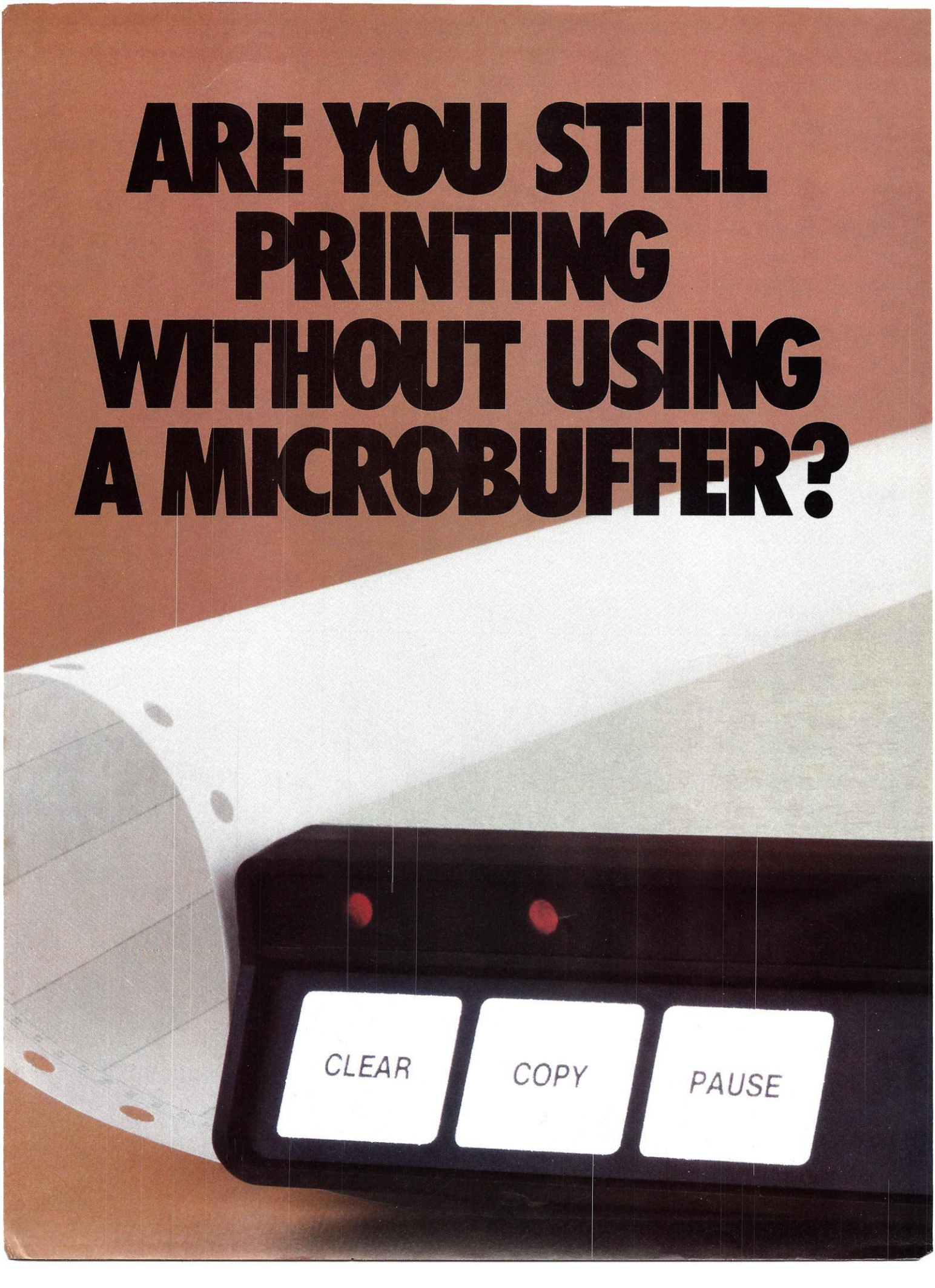
IBM Character Generator

Brainwarp— A Game for the VIC-20



0 14024 14044

ARE YOU STILL PRINTING WITHOUT USING A MICROBUFFER?



WHY?

USING YOUR COMPUTER TO DRIVE YOUR PRINTER IS A WASTE OF TIME.

While your printer is running, your computer is tied up . All you can do is twiddle your thumbs until the program is finished.

MICROBUFFER ALLOWS YOU TO PRINT AND PROCESS SIMULTANEOUSLY.

You just dump your printing data directly to Microbuffer, whoosh!, and continue processing.

Microbuffer accepts data as fast as your computer can send it. It first stores the data in its own memory buffer, then takes control of your printer.

It's that easy.

THERE IS A MICROBUFFER FOR ANY COMPUTER/PRINTER COMBINATION.

Microbuffers are available in Centronics-compatible parallel or RS-232C serial versions.

FOR APPLE II COMPUTERS, Microbuffer II features on-board firmware for text formatting and advanced graphics dump routines. Both serial and parallel versions have very low power consumption. Special functions include Basic listing formatter, self-test, buffer zap, and transparent and maintain modes. The 16K model is priced at $259 and the 32K, at $299.

FOR EPSON PRINTERS, Microbuffer is $159 in either an 8K serial or a 16K parallel version. The serial buffer supports both hardware handshaking and XON-XOFF software handshaking at baud rates up to 19,200. Both interfaces are compatible with Epson commands including Graftrax-80 and Graftrax-80+.

ALL OTHER COMPUTER/PRINTER COMBINATIONS are served by the in-line, stand-alone Microbuffers. (Pictured here, twice actual size.)

Both serial and parallel versions are expandable up to 256K.

The serial stand-alone will support different input and output baud rates and handshake protocol. The 32K model starts at $299, $349 for 64K, and 64K add-ons (for up to a total of 256K) are just $179.

SIMPLE TO INSTALL.

Microbuffer II is slot-independent. It will fit directly inside the Apple II in any slot except zero.

Microbuffer for your Epson mounts easily in the existing auxiliary slot directly inside the Epson printer.

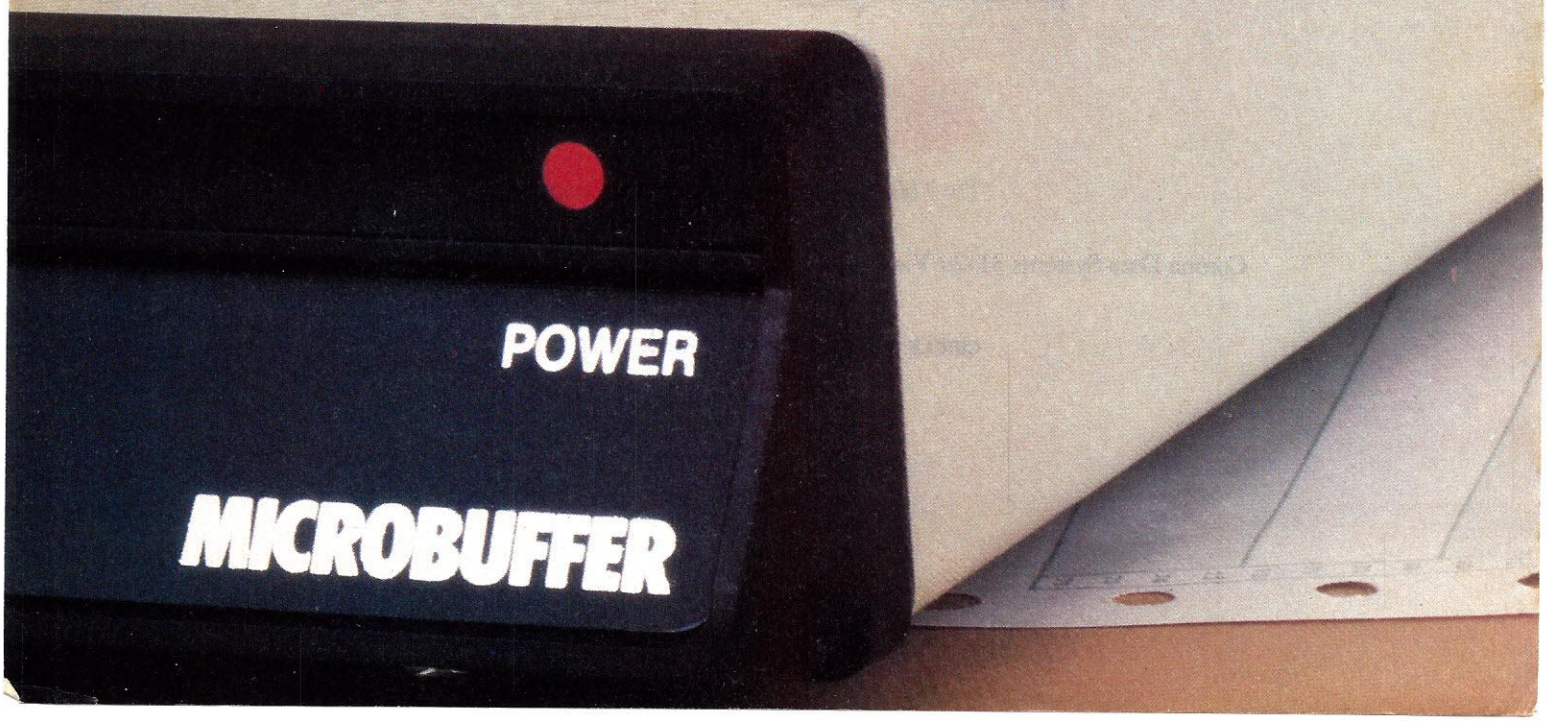
The stand-alone Microbuffer is installed in-line between virtually any printer and any computer.

MICROBUFFER FROM PRACTICAL PERIPHERALS.

When you think of how much time Microbuffer will save, can you afford to *not* have one?

PRACTICAL PERIPHERALS, INC.™
31245 LA BAYA DRIVE
WESTLAKE VILLAGE, CA 91362
(213) 991-8200

CIRCLE 236 ON READER SERVICE CARD



As IBM would design it

The Personal Hard Disk™ from Corona™.
Only for the IBM Personal Computer.

Corona specialization makes the difference:

It fits right in—right inside the IBM Personal Computer, with no external power supply.

And it makes friends fast—with self-documenting, menu-driven, very "user-friendly" software.

It responds to your needs—for multiple operating systems on the same disk at the same time, in flexible partitions that grow as needed.

It backs you up—on floppies, using "selective" backup (by date, by volume, by category), so an additional backup device is not needed.

And it has reliability you can count on—combining exclusive use of Seagate drives with Corona's DataGuard™ and FailSafe.™

And the price?

$1995 for 5 MB,

$2495 for 10 MB

Experience the difference specialization makes.

Ask your dealer to show you the Corona Personal Hard Disk (or call us for dealership and quantity purchase information).

corona

The Third Generation Microcomputer Company

Corona Data Systems 31324 Via Colinas, Section 110, Westlake Village, CA 213-706-1505

CIRCLE 150 ON READER SERVICE CARD

in this issue...

evaluations & profiles

8 **The Franklin Ace 1000** ..... *Carpenter*
An Apple work-alike for home or office

21 **The Commodore 64** ..... *Jeffries*
Just a 40-column Vic?

30 **The Amdek Color II** ..... *Hockenhull*
A high-resolution RGB monitor

39 **Apple Graphics Utilities** ..... *Murphy*
Graphics Magician and Graphics Processing System

46 **Two Ada Compilers** ..... *Gilpin*
A comparative review

54 **Ceemac** ..... *Jackson*
A structured graphics language for the Apple

59 **Speedread+** ..... *Stolker*
Improve your reading speed

64 **E-Z Learner** ..... *Murphy*
A program to help you memorize facts

68 **Avalanche Of Apple Games** ..... *Ahl, Jacobs, Rost & Vogeli*

94 **Eamon** ..... *Plamondon*
An extensive, inexpensive adventure series

104 **Aeronaut** ..... *Cashman*
Flying high with TI

110 **Gridiron Action And Antiks** ..... *Hixson & Leemon*
Two Atari games for long winter nights

articles

116 **The Personal Computer World Show** ..... *Kewney*
Dragons, Acorns and other micro-innovations

120 **Telephones, Toilets, And Car Parks** ..... *Staples*
Random observations on life in England

123 **Microcomputer Chess Tournament** ..... *Harrington*

132 **Logo Ideas** ..... *Lawler*

136 **When is Computer Art Art?** ..... *Mueller*
A dissenting view

146 **Pixel Averaging** ..... *Cook*
Smooth graphics and effects

January, 1983
Volume 9, Number 1

Creative Computing (ISSN 0 097-8140) is published monthly by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class postage paid at New York, NY 10001 and at additional mailing offices.

Copyright ©1982 by Ahl Computing, Inc. All rights reserved.

Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone (201) 540-0445.
Domestic Subscriptions: 12 issues $24.97; 24 issues $43.97; 36 issues $57.97. POSTMASTER: send address changes to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.

applications & software

162 **Stereo Graphics** ..... *Fowler*
Three-dimensional effects for personal computers

192 **Computer Art For The Tektronix 4052** ..... *Jacobson*
Programming polar coordinate curves

202 **Three Ways Of Looking At A Function** ..... *Fuller*

214 **Linked Lists** ..... *Coleman*
They're alive and well in computer graphics

224 **MX-80 Graphics From Pascal** ..... *Dousette*

234 **An IBM Character Generator** ..... *Fan*
Customized characters for special purposes

238 **TRS-80 Graphics Made Almost Painless** ..... *Crew*

250 **Colorful Circles** ..... *Foxx*
Filling and coloring Apple circles

258 **Programming Wheels** ..... *Hastings*
Useful subroutines for the IBM PC

266 **Picture Zapper** ..... *Tenney*
Eliminate black holes and Venetian blinds

268 **Draw Art** ..... *Pitzel*

270 **8 x 8 Create** ..... *Spahitz*
A Vic character Generator

274 **Why We Really Buy Creative** ..... *Gunther*

279 **Brain Warp** ..... *Scroggin*
A cube program for the Vic

departments

6 **Dateline: Tomorrow** ..... *Ahl*
News and Views

26 **Seven Years Ago** ..... *Ahl*
As we were

282 **New Products** ..... *Anderson*

290 **The Graph Paper** ..... *Lubar*
Part seven: Scrolls and other creatures

302 **Apple Cart** ..... *Coffey*

306 **Outpost: Atari** ..... *Anderson*
Upstart Atari

312 **IBM Images** ..... *Fastie*
Personal finance programs

324 **The Other Side** ..... *Kewney*

326 **Personal Electronic Transactions** ..... *Clifton*
64 sprites explained

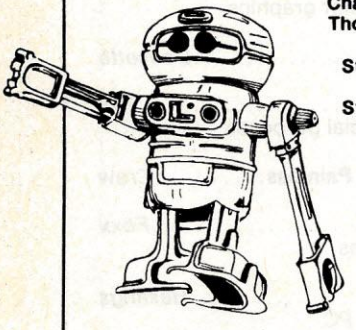
332 **TRS-80 Strings** ..... *Gray*

350 **Index To Advertisers** .....

Cover illustration by Michael Carroll.

staff

Founder/Editor-in-Chief	**David H. Ahl**
Editor	**Elizabeth B. Staples**
Managing Editor	**Peter Fee**
Technical Editor	**Michael Coffey**
Associate Editor	**John Anderson**
Editor-at-Large	**Ted Nelson**
Contributing Editors	**Dale Archibald** **Charles Carpenter** **Thomas W. Dwyer** **Will Fastie** **Stephen B. Gray** **Glenn Hart** **Stephen Kimmel** **Harold Novick** **Peter Payack** **David Small** **Alvin Toffler** **Gregory Yob** **Karl Zinn**
Staff Writer	**Owen Linzmayer**
Editorial Assistants	**Andrew Brill** **Laura Gibbons**
Secretary	**Nina Zollo**
Art Director	**Patrick Calkins**
Assistant Art Director	**Chris DeMilia**
Artists	**Diana Negri Rudio** **Eugene Bicknell** **Linda Lipka**
Production Coordinator	**Christina L. Erickson**
Typesetters	**Karen Brown** **Renea Cole**
Advertising Director	**Jeff Weiner**
Creative Computing Press	**Laura Conboy** **Claudette Moore**
Operations Manager	**William L. Baumann**
Comptroller	**Patricia Kennelly**
Accounting	**Jennifer H. Shaler**
Bookkeeping	**Ethel Fisher**
Retail Marketing	**Jennifer Burr**
Fulfillment	**Frances Miskovich** **Rosemary Bender** **Linda Blank** **Pat Champion** **Susan DeMark** **Elsie Graff** **Gail Harris** **Linda McCatharn** **Bridget Maher** **Joanne Sapio** **Carol Vita** **Barbara Werry** **Jim Zecchin**
Shipping & Receiving	**Ronald Antonaccio** **Mark Archambault** **Bill Thomas** **Scott McLeod** **Mike Gribbon** **Strawvey Montgomery**



advertising sales

Advertising Director
Jeff Weiner
Creative Computing
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016
(212) 725-7957

Advertising Coordinator
Ruth Darling
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-3446

Northern California, Northwest
Jules E. Thompson, Inc.
1290 Howard Ave., Suite 303
Burlingame, CA 94010
(415) 348-8222
From Colorado (303) 595-9299

Southern California, Southwest
Tom Whiteway
Ziff-Davis Publishing Company
3460 Wilshire Blvd.
Los Angeles, CA 90010
(213) 387-2100

New England
CEL Associates, Inc.
27 Adams Street
Braintree, MA 02184
(617) 848-9306

Midwest
The Pattis Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646
(312) 679-1100

Mid-Atlantic
Larry Levine
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-7668

Southeast
Browning Publications
P.O. Box 81306
Atlanta, GA 30366
(404) 455-3430

Canada
The Pattis Group
1623 Yonge St.
Toronto, Ontario M4T 241
(416) 482-6288

microform

Creative Computing is available on permanent record microfilm. For complete information contact University Microfilms International, Dept. F.A. 300 North Zeeb Road, Ann Arbor, MI 48106, or 18 Bedford Road, London WC1R 4EJ. England, and Micro Photo Division of Bell & Howell Company, Old Mansfield Road, Wooster, OH 44691.

where to send it

All **editorial material**, including article submissions, press releases, and products for evaluation should be sent to:
Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to **advertising**, including ad copy, questions on billing, and requests for rates, should be sent to:
Advertising Department
Creative Computing
Ziff-Davis Publishing Co.
One Park Ave.
New York, NY 10016

Correspondence regarding **subscriptions**, including orders, changes of address, and problems should be sent to:
Creative Computing
P.O. Box 5214
Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

subscriptions

All subscriptions orders and other correspondence related to subscriptions should be addressed to:
Creative Computing
P.O. Box 5214
Boulder, Colorado 80321.

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S.		Canada		Foreign	
1 year	$24.97	1 year	29.97	1 year	34.97
2 years	43.97	2 years	53.97	2 years	63.97
3 years	57.97	3 years	72.97	3 years	87.97

Airmail delivery on foreign subscriptions is available for a one-year period only at $75.00 additional for mail to Asia and Australia, and $50.00 additional for all other foreign.

Subscribers in the United Kingdom may send payment in sterling to:
Hazel Gordon
27 Andrew Close
Stoke Golding
Nuneaton, CV13 6EL

Please allow at least eight weeks for change of address. Include old address as well as new—enclosing if possible an address label from a recent issue.

attention authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

January 1983 © Creative Computing

Introducing the Most Powerful Business Software Ever!

TRS-80™ (Model I, II, III, or 16) • APPLE™ • IBM™ • OSBORNE™ • CP/M™ • XEROX™

The VERSABUSINESS™ Series

Each **VERSABUSINESS** module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

VERSARECEIVABLES™ $99.95

VERSARECEIVABLES™ is a complete menu-driven accounts receivable, invoicing, and monthly statement-generating system. It keeps track of all information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSARECEIVABLES™ prints all necessary statements, invoices, and summary reports and can be linked with VERSALEDGER II™ and VERSAINVENTORY™.

VERSAPAYABLES™ $99.95

VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™, you can even let your computer automatically select which vouchers are to be paid.

VERSAPAYROLL™ $99.95

VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government-required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER II™ system.

VERSAINVENTORY™ $99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

VERSALEDGER II™ $149.95

VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system **without any additional software.**

- VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
- stores all check and general ledger information forever,
- prints tractor-feed checks,
- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

SATISFACTION GUARANTEED!

Every **VERSABUSINESS™** module is guaranteed to outperform all other competitive systems, and at a fraction of their cost. If you are not satisfied with any **VERSABUSINESS™** module, you may return it within 30 days for a refund. Manuals for any **VERSABUSINESS™** module may be purchased for $25 each, credited toward a later purchase of that module.

To Order:

Write or call Toll-free (800) 431-2818
(N.Y.S. residents call 914-425-1535)

* add $3 for shipping in UPS areas
* add $4 for C.O.D. or non-UPS areas
* add $5 to CANADA or MEXICO
* add proper postage elsewhere

VISA AMERICAN EXPRESS MasterCard

DEALER INQUIRIES WELCOME

All prices and specifications subject to change / Delivery subject to availability.

COMPUTRONICS INC.

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977

* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. - *APPLE is a trademark of Apple Corp. - *IBM is a trademark of IBM Corp. - *OSBORNE is a trademark of Osborne Corp. *CP/M is a trademark of Digital Research - *XEROX is a trademark of Xerox Corp.

CIRCLE 146 ON READER SERVICE CARD

ow...dateline:tomorrow...dat

David H. Ahl

An IBM Home Computer?

With demand for the IBM Personal Computer (PC) still far exceeding supply even though the company is turning out 15,000 machines a month, can IBM be eying the home market? It seems likely.

This January for the first time, IBM plans to exhibit at the Consumer Electronics Show. Interestingly, Apple and Radio Shack have both shunned CES of late, perhaps feeling that the video games image would hurt their sales to business and professional customers. But IBM is leaping into the CES arena with a large booth in a prime location.

At $3,500 plus, the current IBM PC is not a serious contender in the truly home market, hence, it is reasonable to expect a new low-ended unit at the show. While IBM is being tightlipped as usual, at least three market researchers (Future Computing, Dataquest and the Yankee Group) also expect a lower performance computer from IBM in 1983.

Pac-Man on the Move

With bus ridership on the decline, Daniel Prins, president of Jefferson Lines, Inc. was willing to try some innovative tactics. Jefferson serves north-south routes from Minneapolis to New Orleans and hits places like Little Rock, Houston, Kansas City and Ames, Iowa. Most buses are not completely full, so Prins pulled the rear seats and replaced them with Pac-Man games.

"People just love it," Mr. Prins said. Ridership is holding up, and Jefferson is doing just fine against Greyhound and Trailways.

Prins is obviously concerned about deregulation, pricing and route structures. But he pays attention to less momentous decisions, too. "Right now I am grappling with the question of whether to continue with Pac-Man on the buses, or take my six-year-old son's advice and go with Donkey Kong. It's these really big issues that get you down."

Commodore MAX to Compete with Timex/Sinclair?

Jack Trameil, CEO of Commodore, said the company will introduce a home computer "in the $99 range" in 1983. "Timex/Sinclair has broken the $100 barrier, and we'll be there, too." Trameil gave no details, but one might expect that the announced but not released 2K MAX video game/computer might be offered for $99 instead of the originally planned $179.

Commodore also announced that production of the VIC-20 will be moved to West Chester, PA because of increased volumes of both the VIC-20 and 64. VIC-20 production will be increased from 2,000 to 3,000 per day, while production of the 64 in Santa Clara is being increased to 10,000 a month.

New Atari Computer

In a low-key announcement about shifting some computer production to Hong Kong and Taiwan, Atari mentioned that production of a new computer will begin in the second quarter of 1983. Variously known by code names such as Sweet 16, 64 and Atari 600, the new machine is reported to be an updated version of the Atari 400 with a standard, full-stroke keyboard.

Video & Arcade Games Magazine to Debut

Amid an already crowded field of entries, Creative Computing will introduce a new magazine, Video & Arcade Games, in January 1983. Differentiating itself from the other me-too entries, it will have more than twice the editorial material of any other magazine and will cover four major areas: arcade games, home video games, computer games and electronic games. It will also carry in-depth reviews of games instead of the press releases carried by some other magazines. Initially, 250,000 copies will be distributed to newsstands; subscriptions may be available later.

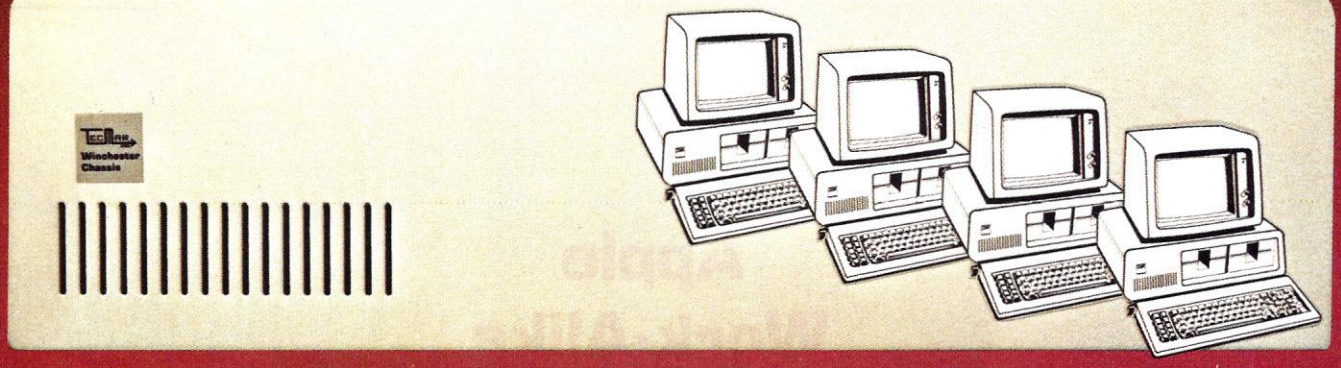
Creative Computing Software Bows Out

With the increased emphasis on magazine and book publishing, Creative Computing has elected to bow out of the software business. The debut of Video & Arcade Games, increasing the frequency of three other magazines from bi-monthly to monthly, and a dramatically stepped up book publishing program will require all of our resources and attention. Hence, we felt we could not continue to be a leader in the software business, too.

Software orders will continue to be filled if inventory is on hand. We are currently making arrangements with other software publishers to take over the line; watch these pages for an announcement about future availability of Creative Computing Software.

SHARED WINCHESTER DISK!

The NEXT STEP from TECMAR



Now, Up to FOUR IBM Personal Computers Can Share the Same PC-MATE Winchester Disk System.

Give each Personal Computer a complete logical device for total READ/WRITE freedom, or they can all share a device for READ Only applications.

All PC-MATE WINCHESTER/5™ and WINCHESTER/10™ disk systems now feature the new ultra fast GT DMA disk controller. This new controller not only provides superior performance, it can serve as the base unit for the Shared Disk Facility.

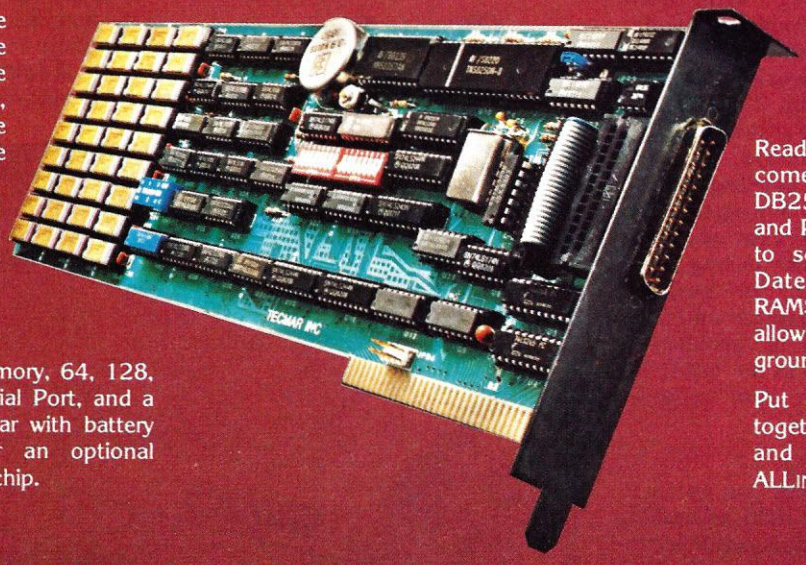
The WINCHESTER/5™ is $2995 and WINCHESTER/10™ is only $3995. Each additional PC to share the disk needs only a PC-SHARE™ adapter at just $495.

An Expansion Chassis, Five or Ten Megabyte Winchester Disk, Superior performance and Disk Sharing are just a few reasons why the PC-MATE™ Winchester Disk System should be your next step.

ALLINONE™ EXPANSION FOR THE IBM PERSONAL COMPUTER.

Memory, Serial, Parallel, Clock/Calendar with Battery and more!!!

PC-Mate™ by TECMAR, the first and only complete line of expansion options for the IBM Personal Computer, now brings you the ultimate expansion product, the ALLINONE™ Board.



ALLINONE™ gives you memory, 64, 128, 192 or 256K bytes, a Serial Port, and a Parallel Port, Clock/Calendar with battery backup and circuitry for an optional Programmable Array Logic chip.

Ready to use, ALLINONE™ comes complete with the DB25 connectors on Serial and Parallel Ports, Software to set system Time and Date, and the popular RAMSPOOLER™ utility to allow printing as a background task.

Put all of these features together with these prices, and you really have it ALLINONE™

$565. - 64K Bytes $735. - 128K Bytes $875. - 192K Bytes $975. - 256K Bytes

Tecmar is currently shipping over thirty different expansion products including Memory, Winchester Disks, Communications Interfaces, Laboratory/Scientific/-Industrial products and more!

For IBM Personal Computer Expansion, The Next Step . . . . ***TECMAR.***

Call or write for product specifications and the name of your nearest participating Computerland and other fine PC-Mate Retailer internationally.

Tecmar Inc.

PERSONAL COMPUTER PRODUCTS DIVISION
23600 Mercantile Road, Cleveland, Ohio 44122
Telephone: (216) 464-7410 Telex: 241735

CIRCLE 352 ON READER SERVICE CARD

creative computing equipment evaluation

Apple Work-Alike

Chuck Carpenter

Having one personal computer that will do most everything I want to do has always seemed highly unlikely. That is, until I tried the Franklin Ace 1000, an Apple work-alike computer from the Franklin Corporation.

By simply including a standardized, full size ASCII keyboard, the Ace 1000 comes close to meeting all my requirements, primary among which is word processing. Others include communications, hardware testing, and software development for business purposes (test, measurement and control, not accounting or inventory). Let's take a closer look at the Ace 1000; perhaps it will meet your requirements, too.

Features

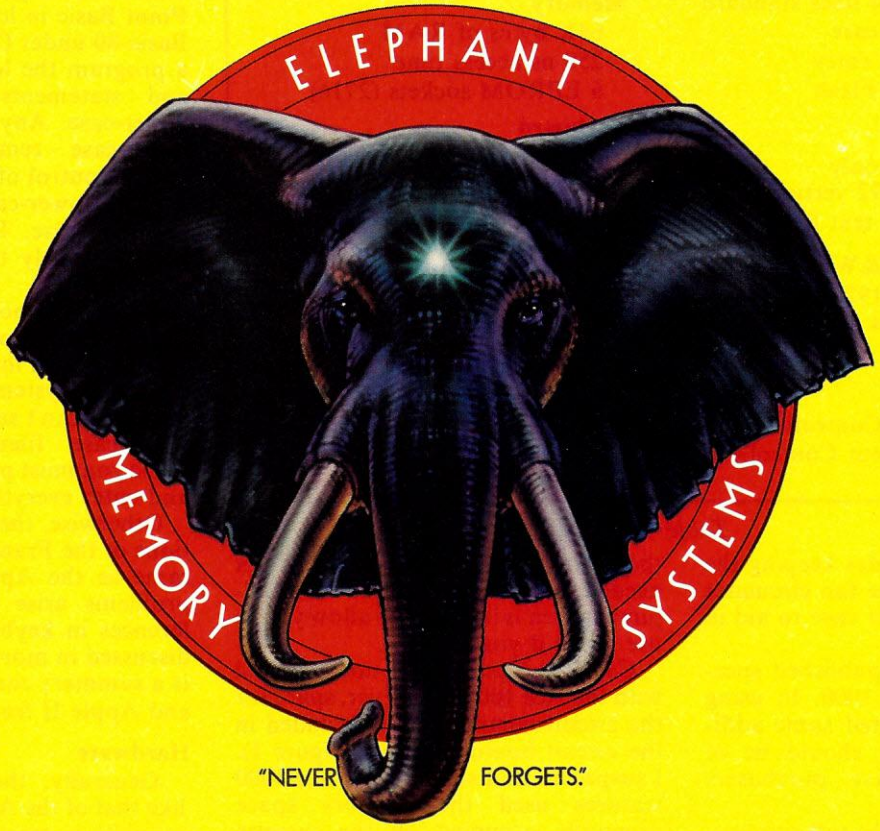
One of the first things you notice is the size of the Ace 1000 assembly. Some of this added size is width necessary to accommodate the length of the full size keyboard. Inside, extra space is needed for the large power supply and the spacious main circuit board.

Extra space on the circuit board means more room between components and between cards in the expansion slots. With more room between parts, cooling is improved and heat related problems are less likely to occur.

Additionally, the power supply has a built-in fan, which is noisy but not

Chuck Carpenter, 3714 Bishop Hill Drive, Carrollton, TX 75007.

REMEMBER:



MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

ELEPHANT.™ HEAVY DUTY DISKS.

For a free poster-size portrait of our powerful pachyderm, please write us.
Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 192 ON READER SERVICE CARD

Franklin Ace 1000 Specifications

Microprocessor
6502 at 1.022 MHz

Text
40 characters x 24 lines standard
5x7 upper/lower case
Direct lower case entry
Normal, Inverse, Flash

Graphics
Black and White only
40 horizontal x 192 vertical
40 vertical with 4 text lines

Hi-Res Graphics (B&W)
280 horizontal x 192 vertical
160 vertical with 4 text lines

Cost
$1530 Processor
$ 579 Drive and Controller
$ 479 Drive without Controller

EME/RFI
FCC Class A Service
Class B pending

Memory
64K bytes of RAM
250 ns access time
6 EPROM sockets (2716)

Keyboard
72 keys upper/lower case
15 key Visicalc pad
2 special function keys

I/O
Joystick/paddle connectors
8 expansion slots

Physical
17¾" x 4½" x 19¾"
15 pounds

Power
115 VAC, 60 Hz, 65 watts

Table 1.

objectionably so. Besides keeping the power supply cool, the fan circulates air inside the computer case to aid in component cooling.

Table 1 shows the published specifications of the Ace 1000. In using the system, I have listed some additional features which should be of interest to prospective purchasers and users.

Most significant is the full-size keyboard. It includes a sculptured design to aid the user, and the layout of the keys is similar to an IBM Selectric. All the key functions worked properly with the languages and programs I tried.

Keys on the keyboard are individually replaceable. Manufactured by Keytronics, the keyboard uses capacitive switches so there are no contacts to wear out. The "feel" is somewhat spongy with a certain amount of tactile feedback to the user. I am used to a keyboard like this so it didn't bother me.

All keys on the keyboard are repeat keys. Consider how much help this feature is when using a word processor. Text editing involving extended cursor movement is greatly improved, for instance.

Two special keys called PAUSE and BREAK are included on the keyboard. These are especially useful in Basic and Pascal programming. PAUSE generates a CTRL-S and BREAK generates a CTRL-C.

Memory for the equivalent of a 16K RAM expansion card is included on the main circuit board. Slot 0 is not needed for this application. A cut-and-jumper area is included to allow you to use slot 0 if you need to.

Cassette capability is not included with the Ace 1000. However, space for the circuit components is included in the circuit board etch (see Figure 1). I suspected that some of the Ace 1000 features used the memory space originally occupied by the cassette input/output (I/O) routines, and on investigation this turned out to be the case. Therefore, the cassette routines are not available in the firmware. Because the Ace 1000 is not considered a hobby machine, the cassette interface was not included.

Booting with the Ace 1000 Master Disk allows you to enter Floating Point Basic in lower-case. (Similar to Basic-80 under CP/M.) When you list a program the lower-case commands and statements are converted to upper-case. Any variables entered in lower-case remain in lower-case. Under control of the Ace 1000 Master Disk, a lower-case filename is saved in upper-case. Integer Basic is converted directly to upper-case as you type.

When you boot with an Apple II Master Disk, you can enter Floating Point Basic in lower-case but not disk operating system (DOS) commands. Also you can't save a program using a lower-case filename. For Integer Basic you must press the shift lock key and enter everything in upper-case.

Otherwise, the operation and functions of the Franklin Ace 1000 are the same as the Apple II. A few minor problems arise because of the differences in keyboards. These will be discussed in more detail later. Table 2 is a summary comparison of Ace 1000 and Apple II features.

Hardware

Generally, the hardware is much like that of the Apple II. Power supply capacity is greater — about 65 watts for the Ace 1000 and 40 for the Apple II. Memory expansion (16K) is built-

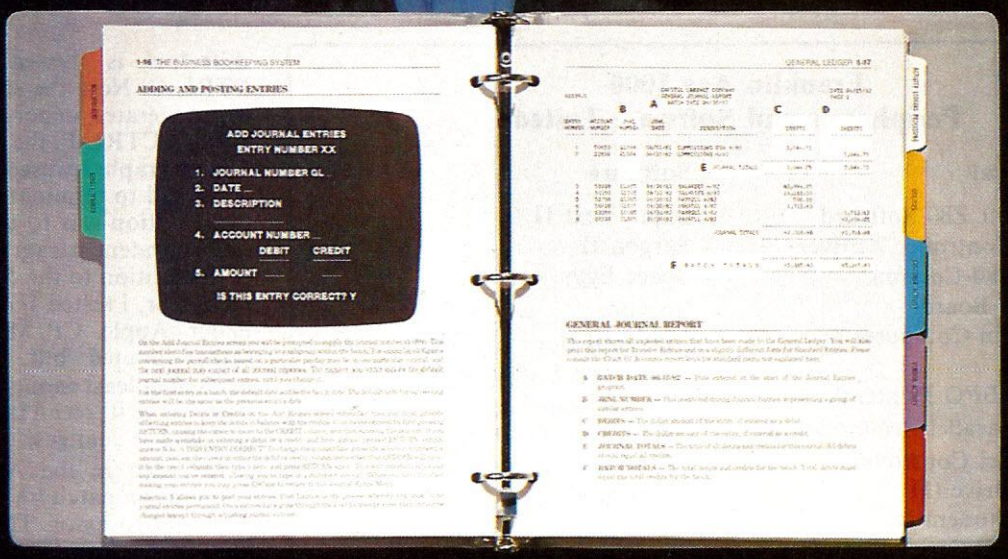
Franklin Ace 1000 Comparison

Item Supplied	Apple II	Ace 1000
Full upper/lowercase keyboard	No	Yes
Cassette interface	Yes	No[1]
Color graphics	Yes	No
Black and white graphics	Yes	Yes
Visicalc 15-key keypad	No	Yes
80-Character columns[2]	No	No
Power supply with fan	No	Yes
64K RAM memory[3]	No	Yes
Mini-assembler[4]	Yes	Yes
Floating Point routines[4]	Yes	Yes
Sweet-16 interpreter[4]	Yes	Yes
Programmer's aid routines[4]	Yes	Yes

(1) Circuitry of components included on the main circuit board.
(2) Videoterm or equivalent board suggested.
(3) 16K equivalent expansion board built-in to Ace 1000 main circuit board.
(4) Available with soft-loaded Integer Basic or Integer Basic ROM card.

Note: A ROM card or memory expansion card can be used in slot 0 if appropriate cuts-and-jumpers are added to the selection block area of the main circuit board.

Table 2.



A Cheap Trick.

The Dakin 5 Business Bookkeeping System.™ We do more, faster—yet cost less than any comparable program!

That, our competitors may feel, was a cheap trick. Not so.

It took no magic at all to make us shine. We used our heads—and gave our customers what they asked for. A Quick, easy-to-use system that encompasses general ledger, vendor activity, customer activity and employee activity. Aging with receivables. Visual documentation. Toll-free hot line for technical support. And a reasonable price.

No matter what your accounting needs are—from personal to business—the Dakin 5 Business Bookkeeping System™ solves the problems. (So does our Budget Planner,™ Depreciation Planner,™ Analyzer,™ and Programming Aids.™ But more on that and other versatile new tricks later.)

Dakin 5. We give it all to you. Faster, easier and for less. Honestly.

Just ask your local computer retailer.

Dakin 5. Answers that put an end to the disappearing dollar.

Today's Program

Dakin 5 Business Bookkeeping System	Dakin 5	The "Other"
Documentation:	yes	no
Indexed	yes	no
"How to Use" Illustrations	yes	no
Extensive Error Trappings	yes	no
Toll Free Technical Support	yes	
Demonstration Diskettes		16
Number of Reports Generated	22	no
Standard Entries	yes	no
Easy Start Up	yes	no
User Friendly	yes	yes
Complex Accounting Knowledge Required	no	no
Displays Available Transactions	yes	no
Sort Key	yes	no
Summary Reports:	yes	no
Balance Sheet	yes	no
Trial Balance	yes	$395.00
Profit & Loss Statement	$395.00	no
Price	$395.00	$395.00

☐ Please send information on the Business Bookkeeping System
☐ Also enclose information on other Dakin 5 business software.

Name _____

Address _____

City _____ State _____ Zip _____

DAKIN 5 CORPORATION
7000 Broadway, Suite 304, Denver, CO 80221 (303) 426-6090.
Toll free Hot Line: 800-525-0463

CIRCLE 155 ON READER SERVICE CARD

Franklin Ace 1000
Peripherals and Software Tested

Peripheral	Software
Microsoft Z80 Softcard	Super-Text II
Apple Controller 2 drives	Sargon II
Wesper 80-Column Video Board	Space Eggs
Mountain Computer Clock	Gorgon
Wesper BPO Printer Buffer	Universal Boot Initializer
Apple Parallel Printer Board	Flash! I/B Compiler
Micro-Sci Controller and Drive (1)	S-C Assembler 4.0
Hayes Modem II	Data Capture 4.0/80
MPC SIO Serial Printer Board	CP/M and Basic-80 (MBasic)
	Locksmith 4.1
	CP/M and Wordstar W/P
	Visicalc
	Pascal

(1) Optional drive supplied by Franklin

Table 3.

in, or you can use slot 0 for memory expansion of your choice. To use slot 0, you make cuts to a designated block on the main circuit board.

There are several other memory options you can select through cuts and jumpers with this board option too. They are described in the User Manual. A reset button is provided under the left front edge of the case.

Operating the Ace 1000 is much like running an Apple II. I remove all the cards from my Apple — except the language card — and inserted them in the Ace 1000. Without exception, all of them worked.

I used the dual drives from my Apple for most of the test. Drives available from Franklin are Micro-Sci drives (reported to be manufactured under license by Franklin). I tested single Micro-Sci drive and controller and both worked without any apparent problems.

To gain further assurance I tried a sampling of software from my collection. Other than the minor problems alluded to above, everything worked. Table 3 summarizes the peripheral cards and software I used in the evaluation of the Ace 1000.

Software

Because most all Apple programs expect upper-case input, you must press the shift lock key to make them work (the minor problems). For instance, with *Super-Text,* the character X is used to print a file. A lower-case x wouldn't execute. Furthermore, a filename typed in lower-case wouldn't save. Upper-case filenames worked fine.

Another difference, again with *Super-Text,* concerns shift key operation. With the Apple II and a Videx Keyboard Enhancer, a certain key sequence is required to make the shift key work typewriter style.

By experimenting, I found a sequence that performed a similar function with the Ace 1000 keyboard. First, ADD mode is selected. Next, the shift lock is pressed, followed by a CTRL-C. Now the shift lock or shift key generates upper-case characters. Using a CTRL-P, the code for starting a paragraph, caused the steps just described to terminate their response. My solution was to use the tab function to indent paragraphs.

In addition to the *Super-Text* word processor, I tested *Word Star* running under Apple CP/M. My test was rather limited but showed that it worked at least enough to write a short letter, save it, recall it, and make local and global changes.

Included in the Ace 1000 service manual is a patch for the *Applewriter II* word processor. The patch lets you modify *Applewriter* so it will recognize the keyboard features of the Ace 1000.

Software provided with the Ace 1000 is limited to a Master Disk. Most of the programs are utilities and are much like those included with DOS 3.3. Each program is described in the Users Manual. Diagnostics are also included on the master disk. These utilities will help you locate a problem should you experience difficulty in operating the system.

Except as noted earlier, all programs from the Apple II master disk worked. Integer Basic was loaded into the expansion RAM and it worked too. In fact, the utilities such as the mini-assembler and those from the programmer's aid ROM worked very well.

Along with a check on the machine language utilities, I tried PEEKs,

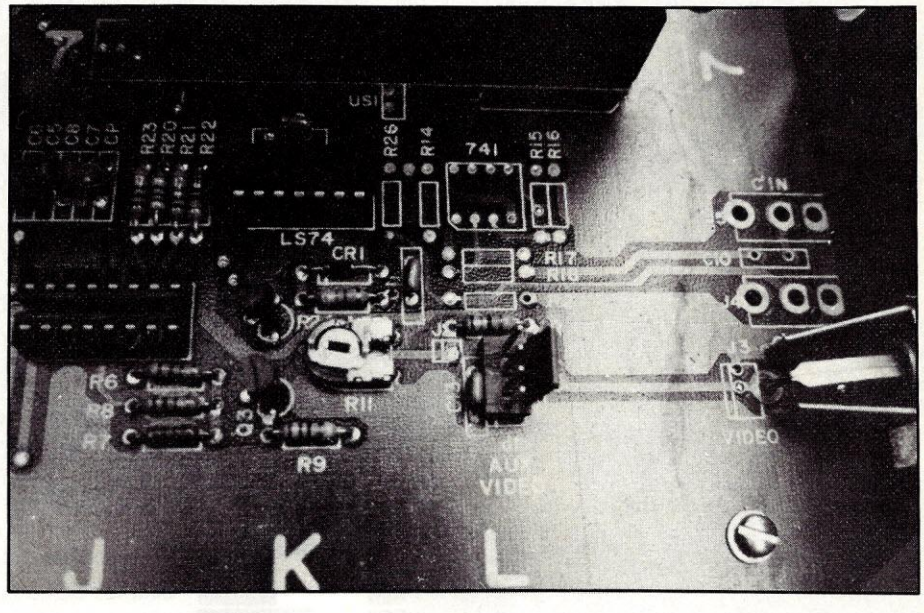
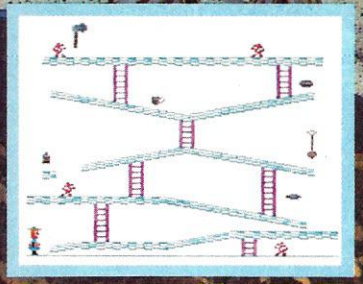


Figure 1. Circuits for cassette interface are included in the circuit board etch. However, the cassette input/output routines are not included in the monitor firmware.

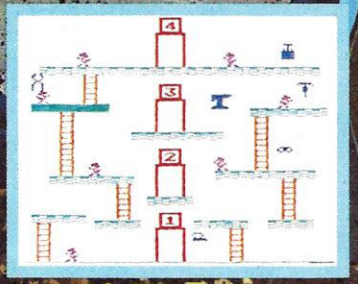
Stake a Claim on the most exciting New Game for your Atari Home Computer.

- From the programming team that brought you "Robot Attack", "Defense Command" and many other great Arcade games for your TRS-80™
- 100% machine language
- 16K ROM Cartridge, the largest available anywhere!
- Written specifically for the Atari® — not a converted Apple® game.
- Ten different rounds
- Difficulty adjustment
- High score table
- Demo mode
- Spectacular sound and graphics
- Runs on any 400/800 with at least 16K memory
- Only $49.95

Here are just three of ten rounds in the game:



Round 1: The Mine Shaft.
Sharpen your miner's skill!



Round 3: The Transporters.
Beam yourself up!

Round 10: The Cannon.
Shoot yourself to the top!

5200 version available now

BIG FIVE SOFTWARE

P.O. Box 9078-185 · Van Nuys, CA 91409 · (213) 782-6861

CIRCLE 125 ON READER SERVICE CARD

To order, see your local dealer. If they do not have "Miner 2049er" then send a check or money order to us for $49.95 plus $2.00 for shipping and handling for immediate shipment! (California residents add 6½% sales tax.)

"Atari," "Apple," and "TRS-80" are trademarks of Atari Inc., Apple Computer, and Tandy Corp., respectively.

POKEs and CALLs from the Integer and Floating Point Basics. As expected, as long as no routines from the cassette I/O are used, all access to memory locations functioned properly.

Documentation

Documentation is rather sparse. The Users Manual is all you get. If you want to learn any more than how to operate the machine, look elsewhere. There are no descriptions of programming languages included in the manual.

In fact, there is less information in the Ace 1000 manual than there was in the first Apple II manual. At least the original Apple manual included memory usage, a summary of machine language and Integer Basic commands, and sample programs. I expect some improvement in the area of documentation very soon.

If you are considering purchasing the Ace 1000 as a second Apple-like computer, all you need to know is how the new system works. More than likely you will already have all the documentation you need to describe programming languages. If Ace 1000 will be your first machine, locate and purchase as many of the Apple II manuals as you can.

Conclusions

For those who want to use a personal computer as a word processor, the Franklin Ace 1000 is an excellent choice. The full size upper- and lower-case keyboard is a delight to use. This review was written on the Ace 1000.

If you want a system, as I do, with flexibility, ease of expansion, and functional utility, the Ace 1000 will do the job quite nicely, especially if you are considering a second computer and already .have documentation. Software for personal, business, professional, and development applications is available through many sources.

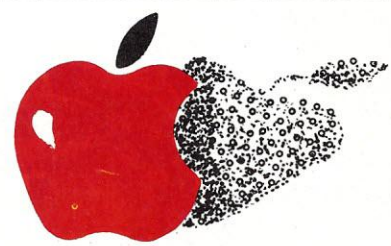
If you are interested in color graphics, however, forget it. The Ace 1000 generates only shades of grey and black and white (assuming you use a black and white monitor). A color adapter board is "soon to be available." It will plug in to one of the expansion slots.

Based on my evaluation of the computer, I suspect that any software or peripheral that will work on an Apple II, will work on the Franklin Ace 1000.

The Apple II is probably to be at the peak of its product life right now and, the Ace 1000 should help to stimulate the market for Apple-compatible products. The new Apple work-alike products won't injure the Apple market, they will enhance and sustain it.

One caveat: make sure the company manufacturing your Apple work-alike will support the product. Franklin appears to be establishing the required support network. High Technology, the local distributor, has been involved with factory training programs through Franklin. In turn, High Technology provides training and support for its dealers.

Franklin Computer Corporation, 7030 Colonial Hwy., Pennsauken, NJ 08109. (609) 488-1700. □



PINBALL NOW AVAILABLE FOR THE ATARI

Features:

- 10 selectable modes of play, including *Easy, Competition, High Speed,* and *Cosmic.*
- 40 user-adjustable parameters: create and save your own custom games.
- an instruction card, a hi-score disk label, and a 16-page manual explaining all of the variations available.
- all for only $29.95

subLOGIC
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482
Telex: 206995

See your dealer . . .

or for direct orders, specify ATARI 400/800 (32K) cassette or disk. APPLE II (48K) disk. Add $1.50 and indicate UPS or first class mail. Illinois residents add 5% sales tax. Visa and MasterCard accepted.

CIRCLE 275 ON READER SERVICE CARD

Sirius™ All Star Games

SUPER FUN!

All software represented in this advertisement are copyrighted products of Sirius Software, Inc., 10364 Rockingham Drive, Sacramento, California 95827, (916) 366-1195. All rights reserved. Apple is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. IBM is a trademark of International Business Machines Corp. VIC-20 is a trademark of Commodore Business Machines, Inc. Games of the Century is a trademark of Fox Video Games, Inc.

CIRCLE 257 ON READER SERVICE CARD

Spinnaker presents Delta Drawing.™

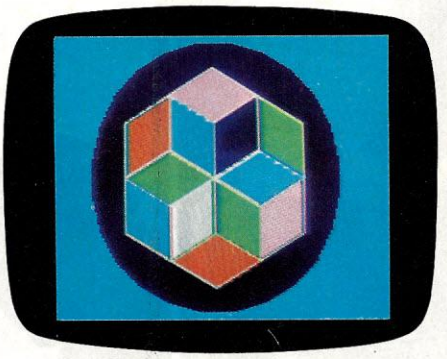
An introduction to the modern art of programming using the ancient art of drawing.

© Spinnaker Software Corp., 1982

Kids love to draw.

And with Delta Drawing, your children can have fun creating their own colorful drawings, and at the same time, learn about computer programming.

Delta Drawing is much more than just a fun game. It's an educational tool that helps children develop their creativity, learn to write computer programs and build an understanding of procedural thinking.



Easier to use than LOGO.

Delta Drawing makes it easy for children to use the computer—even if they've never used a computer before.

In fact, it's easier to use than LOGO turtle graphics. And Delta Drawing costs less than half as much as LOGO.

With Delta Drawing, your child controls the Delta cursor, and the Delta cursor controls all the action. So kids can learn at their own pace while they're having fun.

How your children will learn programming.

With Delta Drawing, your child first creates a picture using simple, single-key commands, for example: "D" for draw, "L" for left, "E" for erase.

As the picture is being drawn, the computer keeps track of every keystroke and records it as a program.

Then, by touching the "T" key for "text mode," the child can see the program that was written. As children progress, they can begin to write their programs in the text mode and switch to the graphics mode to see their pictures. They can even switch back and forth between graphics and text modes.

Delta Drawing will make your child comfortable with the computer and helps develop procedural thinking—the kind of step-by-step approach needed to write programs and solve problems with computers.

Get Delta Drawing today.

Delta Drawing can be played on Apple® computers.

It comes complete with easy-to-follow fast-start cards. And for more advanced users, a completely detailed instruction manual.

You can save your child's drawings on a blank disk and even print them, if you have a printer with graphics capabilities.

So look for Delta Drawing at your local software store. Or write to Spinnaker, 215 First Street, Cambridge, MA 02142.

You'll find that when we combined learning and fun, we created a work of art.

SPINNAKER™

We make learning fun.

Apple is a registered trademark of Apple Computer, Inc.

THE THREE PERSONAL COMPUTERS EXPERTS SAY "BLOW EVERYTHING ELSE OUT OF THE MARKET."

Once in a great while, personal computers come along that drive the normally staid computer press to extremes of praise. The personal computers made by Digital Equipment Corporation are such an example. These are the personal computers about which industry analysts such as The Yankee Group have said: "... comparing other currently available personal computers to (Digital's) Professional series is like comparing a sub-compact car to a Porsche."

Pro 300 series

The minicomputer of personal computers.

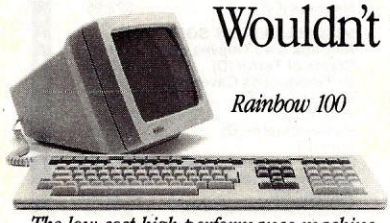
And further: "The trio of personal computers will blow everything else out of the market."

DECmate II

The fully supported small business system.

The Yankee Group was not alone. From the Rosen Electronics Letter: "Digital offers more storage, more memory, more expansion, more columns, and a higher performance central processor." And from The Gartner Group: "...the hardware specifications, design, and future upgrade planning appear superb."

What could inspire such remarks? Perhaps it was a feature like Digital's bit-map graphics—a graphics capability that makes yesterday's graphics look like yesterday's news. Or maybe it was the overall idea of a personal computer that could do more than one thing at a time. Or storage. Or memory. Or the idea of using two central processors instead of one.



Rainbow 100

The low cost high performance machine.

Wouldn't you like to find out a little more about Digital's personal computers? Call 800-DIGITAL and we'll send you our free brochure. Or write: Digital Equipment Corporation, 129 Parker Street, Maynard, MA 01754.

And if our words aren't good enough? Ask anybody else.

digital

MORE PERSONAL. MORE COMPUTER.

Rainbow, DECmate and Professional are trademarks of Digital Equipment Corporation. © Digital Equipment Corporation 1982.

SUPER DISCOUNT PRICES

APPLE®

FOURTH DIMENSION

SUPER DRIVE (w/cont)	$384.95
SUPER DRIVE (wo/cont)	$294.95
DUAL DRIVE (w/cont)	$984.95

MICROTEK

APPLE DUMPING - GX	$75.95
PARALLEL INFC. CARD	$67.95
16K RAM (BAM-16)	$75.95

SOFTWARE FOR BUSINESS AND ENTERTAINMENT

BEAGLE BROS.
Dos Boss (D) $16.95
Alpha Plot (D) $26.95
Utility City (D) $19.95
Tip Disk #1 (D) $13.95
Apple Mechanic (D) $19.95

BRODERBUND SOFTWARE
Choplifter (D) $22.95
Star Blazer (D) $21.95
Davids Midnight Magic (D) ... $22.95
Apple Panic (D) $19.95
Alien Rain "Galaxian" (D) $16.95
The Arcade Machine (D) $64.95
Serpentine (D) $22.95

CAVALIER COMPUTER
Bug Attack (D) $19.95
Microwave (D) $22.95

CONTINENTAL SOFTWARE
The Home Accountant (D) ... $51.95
The Home Money Minder (D) . $24.95
1st Class Mail (D) $52.95

DATAMOST
Snack Attack (D) $19.95
Swashbuckler (D) $22.95

EDUWARE
Compu-Read (D) $19.95
Spelling Bee
w/Read. Prim. (D) $26.95
Compu-Math/Arith. Skill (D) .. $34.95
Algebra I (D) $26.95
Algebra 2 (D) $26.95
Algebra 3 (D) $26.95
Fractions (D) $34.95
Decimals (D) $34.95
Counting Bee (D) $19.95
Compu-Spell/System (D) $19.95
Rendevous (D) $26.95
SAT Word Attack (D) $34.95
Prisoner (D) $19.95

HAYDEN SOFTWARE
Sargon II (D) $24.95
Pie Writer/Standard (D) $94.95
Pie Writer/Double Vis. (D) $94.95
Pie Writer/Multi 80-Col (D) ... $94.95

HOWARD SOFTWARE
Tax Preparer 1982 (D) $114.95
Creative Financing (D) $134.95
Calif. State Tax Preparer (D) .. $55.95
NY/NJ State Tax Preparer (D) . $55.95
Real Estate Anal. II (D) $124.95

INFOCOM
Zork I (D) $26.95
Zork II (D) $26.95
Deadline (D) $33.95

INSOFT
GraForth II (D) $49.95
Electric Duet (D) $19.95

LOTUS
Executive Brief Sys. (D) $125.95

MICRO LAB
Data Factory 5.0 (D) $202.95

MICROSOFT
Olympic Decathlon (D) $19.95
Typing Tutor II (D) $16.95
Fortran-80 (D) $134.95
A.L.D.S. (D) $86.95
Basic Compiler (D) $269.95
MultiPlan (D) $189.95

MUSE
Robot War (D) $26.95
Castle Wolfenstein (D) $19.95
Super Text 40/56/70 (D) $86.95

ON-LINE
HI RES Mission Asteroids (D) $13.95
HI RES Mystery House (D) ... $16.95
HI RES Wiz & Princess (D) ... $21.95
HI RES Cranston Manor (D) .. $23.95
HI RES Ulysses (D) $22.95
HI RES Time Zone (D) $64.95
Maurauder (D) $23.95
Screenwriter II (D) $88.95

ON-LINE (continued)
Lisa 2.5 (D) $53.95
Frogger (D) $22.95
Cannonball Blitz (D) $22.95
Screenwriter Profess'nl (D) . $134.95

PEACHTREE
All Series ..... Call

PENGUIN SOFTWARE
Complete Graphics Sys. (D) .. $48.95
Special Effects (D) $28.95
Graphics Magician (D) $41.95

QUALITY SOFTWARE
Ali Baba & 40 Thieves (D) $21.95
Bag of Tricks (D) $26.95

SENSIBLE SOFTWARE
Super Disk Copy III (D) $20.95
Multi Disk Catalog III (D) $17.95
Disk Recovery (D) $20.95
Dos Plus (D) $17.95
Image Printer (each) (D) $28.95
The Sensible Speller (D) $84.95

SENTIENT SOFTWARE
Congo $22.95
Goldrush $22.95

SIRIUS SOFTWARE
EZ Draw 3.3 (D) $34.95
Gorgon (D) $26.95
Sneakers (D) $19.95
Hadron (D) $22.95
Fly Wars (D) $19.95
Kabul Spy (D) $22.95
Minotaur (D) $22.95
Bandits (D) $22.95
Way Out (D) $26.95

SIR-TECH
Wizardry (D) $34.95
Knights of Diamonds (D) $23.95

SOFTWARE PUBLISHING CORP.
PFS: Report (D) $64.95
PFS: Filing (D) $84.95
PFS: Graph (D) $84.95

SPINNAKER SOFTWARE
Snooper Troops #1 (D) $29.95
Snooper Troops #2 (D) $29.95
Story Machine (D) $22.95
Face Maker (D) $22.95

STONEWARE PRODUCTS
D.B. Master (D) $157.95
D.B. Master Util #1 (D) $69.95
Graphics Proc. Sys (Stand) (D) . $41.95

STRATEGIC SIMULATIONS
Computer Quarterback II (D) . $26.95
Computer Baseball (D) $26.95
Cytron Masters (D) $26.95
Guadalcanal (D) $41.95
S.E.U.I.S. (D) $26.95
Galactic Gladiators (D) $26.95
Battle of Shiloh (D) $26.95
Tigers in Snow (D) $26.95
Cosmic Balance (D) $26.95

SUBLOGIC
Flight Simulator (D) $24.95
Pinball (D) $20.95
Saturn Navigator (D) $23.95

SYNERGISTIC SOFTWARE
Odyssey (D) $20.95
Atlantis (D) $26.95
Global Prog Line Ed. (D) $43.95

VISICORP
Visicalc 3.3 (D) $174.95

MISCELLANEOUS SOFTWARE
Human Fly (D) $20.95
Magic Window (D) $64.95
Master Type (D) $26.95
Micro Painter (D) $23.95
New Step by Step (D) $56.95
Sam (w/DAC) (D) $82.95
Star Ship Command (D) $26.95
Ultima (D) $26.95
Zoom Graphics (D) $26.95
3-D Supergraphics (D) $26.95

ATARI®

800 COMP (48K) $619.00
PERCOM D/D DISK DRIVE .. $559.00

810 DISK DRIVE	$428.00	32K RAM (Mosaic)	$99.00
410 RECORDER	$74.00	32K RAM (Intec)	$69.00
850 INTERFACE	$164.00	48K RAM (Intec/400)	$139.95
400 COMP (16K)	$265.00	RAMDISK	$425.00
ENTERTAINER	$66.95	SIGNALMAN MK II	$78.95
COMMUNICATOR	$298.00	WICO JOYSTICK	$22.95
BOOKKEEPER KIT	$169.00	WICO TRACKBALL	$48.95

SOFTWARE FOR ENTERTAINMENT AND EDUCATION

ADVENTURE INTERNATIONAL
Rear Guard (D) $16.95
Adventures (per set) (D) $28.95
Adventures 1-12 Each (C) .. $17.95
Preppie (C/D) $19.95
War (D) $16.95

APX
Eastern Front 1941 (C/D) ... $22.95
Fam. Cash Flow (D) $16.95
747 Landing Sim. (C/D) $16.95

ATARI INCORPORATED
Microsoft Basic (D) $65.95
Macro Assem. & Editor (D) . $64.95
Assembler Editor (R) $44.95
Basic Cartridge (R) $44.95
Pac Man (R) $32.95
Centipede (R) $32.95
Caverns of Mars (D) $27.95
Missile Command (R) $25.95
Star Raiders (R) $32.95
Asteroids (R) $25.95
Conversational Lang.Ea.(C) $43.95
Music Composer (R) $29.95
Super Breakout (R) $26.95
Computer Chess (R) $26.95
My First Alphabet (D) $25.50
Programming 2 & 3 (ea.) (C) . $21.00
Word Processor (D) $107.00
Pilot (Educ) $98.00
Home File Manager (D) $36.95
Bookkeeper Program (D) ... $98.95

AUTOMATED SIMULATIONS
Invasion Orion (C/D) $16.95
Rescue at Rigel (C/D) $19.95
Temple of Apshai (C/D) ... $26.95
Star Warrior (C/D) $26.95
Datestones of Ryn (C/D) ... $14.95
Dragon's Eye (D) $19.95
Crush Crumber Ch. (C/D) ... $19.95

AVALON HILL
Empire of Overmind (D) $22.95
Voyager (D) $17.95
B-1 Nuclear Bomber (C) $11.95
Lords of Karma (C) $14.95
Tanktics (D) $19.95

BRODERBUND SOFTWARE
Apple Panic (C/D) $19.95
Star Blazer $21.95
Choplifter (D) $22.95
Davids Midnight Magic (D) . $22.95
HI RES Deadly Secrets (D) . $22.95
Steller Shuttle (C/D) $19.95

DATA SOFT
Text Wizard II (D) $64.95
Spell Wizard (D) $52.95
Canyon Climber (D) $19.95
Pacific Coast Hwy (D) $19.95

EDU-WARE
Compu-Read (D) $20.95
Compu-Math Frac. (D) $27.95
Compu-Math Dec. (D) $27.95
Compu-Read (C) $13.95

INFOCOM
Zork I (D) $26.95
Zork II (D) $26.95
Deadline (D) $33.95

JV SOFTWARE
Action Quest (C/D) $19.95
Ghost Encounters (C/D) ... $19.95

K-BYTE
K-Razy Shootout (R) $33.95
K-Star Patrol (R) $33.95
K-Razy Kritters (R) $33.95
K-Razy Antics (R) $33.95
K-Dos (D) $58.95

ON-LINE
HI RES Wiz & Princess (D) .. $21.95
Crossfire (C/D) $19.95
Frogger (C/D) $22.95
Threshold (D) $26.95
Ultima I (D) $26.95
Ultima II (D) $38.95
The Next Step (D) $26.95

OPTIMIZED SYSTEMS
Basic A + (D) $58.95
OS/A + (D) $58.95
Speed Read Plus (D) $42.95

ROKLAN
Deluxe Invaders (D) $22.95
Deluxe Invaders (R) $26.95
Gorf (D) $26.95
Gort (R) $29.95
Wizard of Wor (D) $26.95
Wizard of Wor (R) $29.95

SIRIUS
Space Eggs (D) $19.95
Sneakers (D) $19.95
Way Out (D) $26.95

STRATEGIC SIMULATIONS
The Shattered Alliance (D) . $26.95
Tigers In The Snow (C/D) ... $26.95
Battle of Shiloh (C/D) $26.95

SYNAPSE SOFTWARE
File Manager 800 + (D) $64.95
Protector (C/D) $22.95
Shamus (C/D) $22.95
Nautilus (C/D) $22.95

MISCELLANEOUS SOFTWARE
Ali Baba & 40 Thieves (D) .. $21.95
Crypts of Terror (D) $22.95
Dr. Goodcodes Cavern (D) . $19.95
Master Type (D) $26.95
Pool 1.5 (D) $22.95
Raster Blaster (D) $19.95
Sam (D) $40.95
Sammy the Sea Serpent (C) $12.95
Warlocks Revenge (D) $23.95
Visicalc (D) $168.95
3-D Supergraphics (C/D) ... $28.95

VIC-64 - CALL

VIC-20	$178.95
1530 RECORDER	$58.95
1525 PRINTER	$296.00
1540 DISK DRIVE	$298.00
VIC 16K RAM	$87.95

PRINTERS

NEC 8023A-C	$469.00
SMITH CORONA TPI	$589.00
AXIOM GP-100	$269.00

MONITORS

BMC 12" GRN	$83.95
BMC 13" COLOR	$269.95

D = DISK C = CASSETTE
R = ROM (CARTRIDGE)

THE ABOVE PRICES ARE FOR PREPAID ORDERS

WRITE FOR FREE CATALOG: INDICATE APPLE OR ATARI

COSMIC COMPUTERS UNLIMITED

ORDER LINES OPEN
MON-SAT 8 am - 9 pm

228 N. PROSPECTORS RD.
DIAMOND BAR, CA 91765

(714) 861-1265

APPLE IS A TRADEMARK OF APPLE COMPUTER, INC.
ATARI IS A TRADEMARK OF ATARI, INC.

Add $2.00 Shipping per software order anywhere in U.S. Non-U.S. software orders, add $5.00. Hardware Shipping, call for cost. Calif. residents add 6½% sales tax. Cashiers Checks or Money Orders filled same day. Personal checks require 4 weeks to clear. **Master Card and Visa OK for software only, add 3% surcharge.** Include card no., expiration date and signature. Prices subject to change.

CIRCLE 151 ON READER SERVICE CARD

creative computing equipment evaluation

A Best Buy For '83

Ron Jeffries

The Commodore-64 is a lot of computer for the money. For only $595, it comes with 64K of RAM memory, excellent graphics, a three-voice sound synthesizer, Microsoft Basic, a 6510 microprocessor, a built-in RF modulator to connect with a television, and a typewriter-style keyboard.

Although not a true "open design" such as the Apple II or IBM PC, the 64 has several easy-to-use input/output interfaces built in. There is even a cartridge slot that will allow a Z80 microprocessor or game cartridge to be added to the system.

Commodore has announced that the popular CP/M operating system will be available when the Z80 cartridge is released in early 1983. A single 5¼" floppy disk (Model 1541) is available for an additional $399.

Not A 40-Column Vic

The 64 is packaged in a plastic case that looks exactly like the Vic-20, except that it is brown instead of white. But don't let that fool you: the 64 is *not* a 40-column Vic. The two computers share only two features: the plastic case, and the same version of Pet Basic.

Vic programs that don't use any of the special Vic graphics or sound and that do not rely on the 22-column screen will run on the 64. Unfortunately, those constraints severely limit the number of Vic programs that will work on the 64.

The 64 uses a 6510 microprocessor. The 6510 is exactly like a 6502 (which is used by the Pet, Vic, Apple, and Atari) except that the first two bytes of page zero have been "stolen." These two memory locations are used for an on-chip 8-bit input/output port by the 6510. The 64 uses this port to control its memory map, which makes it unusually flexible.

For example, when a game cartridge is plugged in, the 64 automatically acts just like the Commodore Max Machine game console. This means that the 64 is an inexpensive development system for programmers who want to write Max games.

Excellent Keyboard

The first thing that impressed me when I unpacked the 64 was the excellent keyboard. Several people who have wandered by my office have tried the keyboard, and their comments have all been quite positive.

As is true of most computer keyboards, some keys are not placed where they would be on a standard typewriter. If you are a touch typist, be sure to type for a few minutes on the 64 keyboard before you decide to buy it. The placement of keys on the 64 probably won't bother you.

The keyboard of the 64 is sculptured, which means that the tops of the keys are slightly concave when viewed from the end of the keyboard. (Some keyboards look like a staircase when viewed from that angle.) Most typists seem to prefer the sculptured design, which is what IBM uses for their popular Selectric typewriter.

The 64 keys also have a matte, non-glare surface that is attractive. The "feel" of the keyboard is above average, although for my taste it is a little softer than ideal. There is no audible click when a key is pressed, a feature I have come to appreciate on machines such as the Atari 800.

As a point of reference, the IBM Selectric keyboard is the best I have ever used. My favorite personal computer keyboard is the IBM PC. It has a sharp, "clicky" feel that works very well for me. I rate the 64 keyboard about 7 on a scale of 1 to 10, with the IBM PC rating a 9, and the Selectric getting a perfect 10. Obviously, the $600 64 does very well in comparison with the much more expensive IBM PC.

The 64 keyboard has a somewhat high

R. K. Jeffries, 5266 Hollister, Suite 224, Santa Barbara, CA 93111.

profile. The home row of keys is 70mm above the desk surface. (The 64 looks higher that it is. For example, the fairly sleek Atari 800 has a 77mm high home row.) A low profile keyboard such as the IBM PC places the home row of keys approximately 30mm above the desk top. Research in human factors has shown that low profile keyboard design reduces fatigue in users' fingers and hands.

Commodore decided to use a slightly modified Vic plastic case for the 64, even though that meant having a high profile keyboard. On the other hand, by using existing plastic tooling, they were able to get the 64 to market several months sooner than if they had designed a new case. (They probably also saved $20,000 to $50,000 in development costs.)

Advanced Graphics

The graphics capabilities of the 64 are exciting. Commodore-64 graphics are more powerful than those of the Atari, IBM PC, Apple, TI 99/4A, or Radio Shack Color Computer. (The 64 also has far stronger graphics than its cheaper cousin, the Vic-20.)

The most important feature is its dedicated hardware support for rapidly displaying eight detailed objects anywhere on the screen. Each of these objects (Commodore calls them *sprites*) can be 24 pixels wide and 21 pixels high, or about the same as a block of 3 x 3 characters.

After a sprite is designed, and the dot-by-dot pattern for the display (called a *bit map*) is stored somewhere in memory, the sprite can be moved around on the screen very quickly and easily. All the programmer has to do is POKE the horizontal and vertical location into the appropriate registers of the dedicated graphics procesor called the "Video Interface Chip," or VIC. The VIC chip directly supports eight sprites at one time. (In machine language it is possible to "re-use" sprites, and thus have more than eight of them on the screen at once.)

Sprites Are Versatile

Each sprite has a priority. This allows one sprite to appear to pass in front of another sprite, so that three-dimensional effects are possible. The video chip also keeps track of collisions between sprites, and between sprites and the foreground. This can be very useful when writing sophisticated game programs.

Each sprite can be enlarged to be twice as wide, or twice as tall, or both. However, when a sprite is enlarged, there is effectively half as much resolution, since the same bitmap of 24 by 21 pixels is used. (The pixels making up the sprite are enlarged.)

Likewise, a sprite can use four colors (instead of the normal "on" or "off") at the expense of having half as much resolution.

Until you can see an example program that uses sprites, it is hard to understand what a powerful tool they are. Machines like the Apple that do not support sprites face tough competition from those like Commodore, Atari, and Texas Instruments that do provide this facility. (See "Personal Electronic Transactions" in this issue for more on 64 sprites.)

Video Problems?

In my opinion, the quality of the video image produced by the 64 is poor. So far, I have seen the displays of six 64 computers, and have yet to find one that is as crisp and sharp as the Atari 800 or 400 models, for example. Since I am using a fairly early production model of the 64, this problem may be corrected by the time this review appears in print.

Many combinations of text and background colors produce an unreadable display.

For some reason, the characters on the 64 appear to be "smeared" on the display. This effect is least visible when there is reduced contrast between the character color and the background. I suspect that is why Commodore decided to have the 64 display light blue characters on a dark blue background when it is first turned on. However, this combination of foreground and background colors does not provide as much contrast between text and the background as other popular systems.

Many combinations of text and background colors produce an unreadable display. The background color (as well as the border color) can be changed with two POKE commands. After some experimentation, I have found that blue text on a white background looks pretty good, although it does exhibit some of the character smearing. I trust that Commodore plans to improve the quality of the display.

Music Synthesizer

The 64 produces sound using the 6581 Sound Interface Device (SID). This special chip is a music synthesizer and sound effects generator. It provides three voices that can be controlled by the user.

For each voice, you can control pitch over a nine-octave range. The waveform can be a triangle wave, sawtooth, variable pulse, or noise. (You can create great sound effects for games with the noise waveform. For example, it is easy to produce explosions, shuffling feet, or ocean waves.) For each voice, you can also control volume, and there is a master volume control.

For each of the three voices, you can control what are called *envelope generators*. The way a note or sound effect sounds when it is produced is the result of many different things. Naming the envelope of a given sound is a shorthand way of describing four of the important parameters that control how it sounds.

There are four parameters that describe an envelope: attack, decay, sustain, and release, or ADSR for short. With the 64, the attack rate can be varied from two milliseconds to eight seconds. Both the decay and release rate can range from six milliseconds to 24 seconds, and the sustain level can range from zero to peak volume.

After spending quite a bit of time using a *sound editor* that makes it easy to build new sounds and then experiment with changing them, I am very impressed with what the SID can do. Frankly, I can't remember the last time that I have had this much fun (at least with a computer). When I start playing with 64 sound generation there just doesn't seem to be a good place to stop. Many 64s will be purchased solely because of the SID synthesizer.

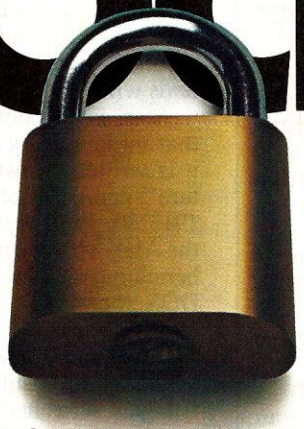
Given the excellent sound and graphics capabilities of the 64, it is too bad that Commodore did not choose to support the new hardware at a high level in Basic. All of the sound and graphics are controlled with POKE statements that change magic memory locations. POKEs are inconvenient for experienced programmers, and completely mystifying to novice users.

Microsoft *has* extended Basic to support graphics and sound on other machines such as the IBM PC. So why was the 64 released with version 2 of the same old Pet Basic, which does not support the new hardware features?

I think that Commodore decided that the 64 would sell very well *without* an enhanced Basic. After all, the 64 is priced relatively low for the features. (Using the existing Pet Basic is another way that development costs were minimized.)

Will there ever be an enhanced 64 Basic? I think it is unlikely. My guess is that a better version of Basic will be one of the features of the $995 P-500. The new computer will have the same color graphics and sound as the 64, and will

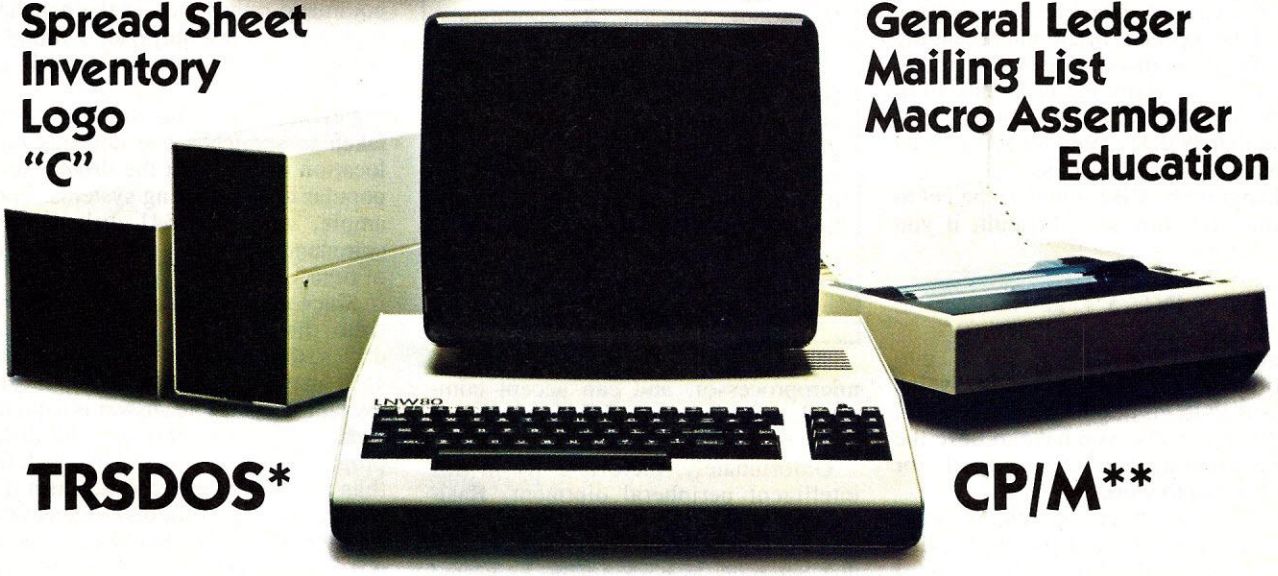
DON'T GET LOCKED IN



Pascal
Basic
Cobol
Forth
Pilot
Fortran
Spread Sheet
Inventory
Logo
"C"

Data Base Management
Word Processor
Communication Utility
Accounts Receivable
Accounts Payable
Engineering Utility

General Ledger
Mailing List
Macro Assembler
Education

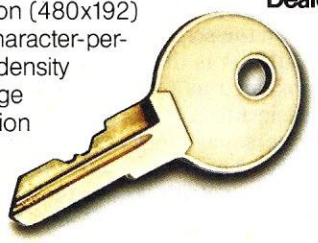


TRSDOS*

CP/M**

Open your doors to a world of SOFTWARE with LNW computers. You'll get **MORE PERFORMANCE**[1] than with the IBM PC[2], the Apple II[3], TRS80 MODEL II or TRS80 MODEL III[4] along with software support of TRSDOS or CP/M, the TWO MOST WIDELY USED OPERATING SYSTEMS. This means you, the user, can select from the largest base of business or personal software.

Standard Features: A serial RS232 communication port, parallel printer port, Hi-Resolution (480x192) B/W and COLOR graphics, an 80 character-per-line screen display along with Quad-density interface for 5" or 8" floppy disk storage offering immediate access to 3.5 million characters, or optional Hard disk interface to 5 or 10 million characters.



Standard Software: LNWBASIC and DOS PLUS operating system packages, commanding all the above features, are included.

The LNW computer will be the key to your success with the starting price at **$1695.00,** along with a full 6 month warranty.

Dealers: You too can open the door to a successful product. Call for our special dealer programs: (714) 544-5745.

LNW Computers
2620 Walnut Avenue
Tustin, California 92680
(714) 544-5744

CIRCLE 197 ON READER SERVICE CARD

*TRSDOS is a trademark of Tandy Corp.
**CP/M is a trademark of Digital Research Corp.
1. Performance is based on bench mark test in the JAN 1982 issue of BYTE magazine, pg. 54, with LNW80 II as the comparison.
2. IBM PC is a trademark of IBM CORP.
3. APPLE II is a trademark of APPLE COMPUTERS.
4. TRS80 is a trademark of Tandy Corp.

International orders please inquire for pricing/shipping cost.

also have 128K of RAM, a 10-key numeric pad, true programmable function keys, and a faster microprocessor.

The 1541 Disk Drive

In addition to supporting the standard Commodore cassette tape format for storing programs and data, the 64 can also be used with the Vic-1541 disk drive. (The original Vic-1540 drive requires a new ROM in order to work with the 64.)

The 1541 uses a 5¼" drive that stores approximately 170,000 bytes. The drive is a single-sided unit that uses Commodore's unique disk format, and is packaged attractively, although the case is white (like the Vic-20) which doesn't match the tan color of the C64.

The disk format used by the 1541 is compatible with the standard Commodore 4040 disk drives that have been used for several years with the Pet and CBM models. This means that disks can be transferred among the 64, the Pet, and the Vic-20.

In the case of data files, no changes should be needed when interchanging files. Pet programs can be transferred to the 64 easily. Many Pet programs work on the 64 after minimal editing. Programs that POKE screen locations must be changed, since the screen has moved.

Changing the CB2 sound of the Pet to use the SID chip isn't difficult, if you use this formula:

```
10 HS = 2 ↑ (1/12)
20 SID = INT(.5 + 14*HS
     (LOG(255/CB2)/LOG(HS)))
```

Where SID is the value to POKE into location 54273, and CB2 is the value that was POKEd into location 59464 on the Pet. Naturally, you have to have the other SID parameters set up correctly for the 64 sound to work.

Commodore plans to release what they call a Pet emulator for the 64, that will do much of the dirty work for you. I think that converting a Pet program to the 64 is a better approach, since there is no runtime overhead, and you can take advantage of unique 64 features such as color, user-programmable characters, sprites, and of course multiple-voice sound.

"Smart Peripheral" Problems

The disk operating system for the 1541 resides in ROMs that are in the 1541, rather that in the 64. The advantage of this approach is that the DOS doesn't consume any RAM in the computer, since it has its own RAM on the disk controller.

Commodore takes great pride in the fact that their system has what they call "smart" peripherals. What this means is that each disk unit or printer has its own microprocessor, and can accept commands from the "main" computer, such as the 64.

Unfortunately, there is a fly in this intelligent peripheral ointment. Basically, the disk is a very independent device. The 64 sends it a command, the disk attempts to perform the requested action, and then sets an error code. Note that I said "sets an error code," not "tells the computer whether things worked or not."

The problem with the Commodore aproach is that the user program (or the user, in the case of commands from the keyboard) is responsible for discovering that an error has occured. When something doesn't work, the 64 does not print an error message on the screen.

The result of all this is that Commodore disk systems such as the 1541 are not among the easiest to use when compared with other personal computer systems. Evidently, there are many consumers who either don't know the difference, or don't care, because Commodore disk systems seem to sell very well.

How to Transfer C64 Programs to the PET

Taking 64 Basic programs to the Pet is somewhat complicated. After LOADing the 64 program into the Pet from disk or cassette, use the PET monitor as follows:

SYS 1024

At this point, the monitor will display the contents of the 6502 registers. We can ignore them, and type the M command to display a portion of the PET memory:

.M 0400 0407

The command shows the contents of the seven bytes that begin at location 0400 hex. We will ignore the values that it displays, and type the following in their place:

.: 0400 00 01 08 00 00 00 00 00

After pressing RETURN, exit from the monitor with the "X" command:

.X

Now, in Basic, type a zero and press RETURN. What we have done is play a trick, using the machine language monitor. We created a fake line zero in the monitor, and then deleted it in Basic. If your program already has a line zero, it will not be deleted, since Basic will only delete the first line zero that it encounters, which will be our fake line.

Limited Disk Speed

The 1541 disk transfers data slower than several other personal computer disk systems. For a simple benchmark, I used a program that writes 10,000 bytes to the disk. (To keep the interpretive overhead down, the program uses a FOR loop that goes from 1 to 500. Each time through the loop a string of 20 bytes is written to the disk.) The 64 with the 1541 disk took 34.8 seconds to write 10,000 bytes. The standard Pet 4040 took 17.5 seconds, and the Atari 800 took 28 seconds with "read-after-write" disabled.

Atari is the only personal computer that automatically reads each sector after it is written. However, this Atari "feature" can be disabled by typing POKE 1913,80. With read-after-write *enabled,* the Atari 810 disk took 46 seconds for the benchmark. The IBM PC with IBM DOS took 11.4 seconds to write the 10,000 bytes.

I ran each disk test several times and averaged the results. Also, the old data file was scratched by using a keyboard command rather than in the benchmark program. To my surprise, I found that scratching a file from the disk takes quite a while.

Furthermore, the amount of time taken to scratch a file depends on the location of a file on the disk in several popular disk operating systems. For example, with the 1541 disk, a scratch command can take a noticeable amount of time.

Since most consumers don't bother to time the performance of their disk drives, the important question about the 1541 may be "Is it fast enough for the average user?" The answer is a qualified "yes." If you mainly use the disk for program storage, *any* disk is much faster than a cassette tape recorder. But if you plan to use the 64 for disk-intensive data management, you should do some serious benchmarking before making a purchase decision. At $399, the 1541 is one of the least expensive disk units available for personal computers.

Conclusions

The Commodore-64 is an excellent value. For $595 you get powerful graphics, a complete sound synthesizer, and a versatile computer with 64K of memory. At the moment, I think it is the "best buy" in the $600 personal computer price range. Now if you'll excuse me, I need to get back and tune-up my 64 snare drum sound effect...

Acknowledgements: Glen Fisher of The Code Works provided numerous clarifications of the technical details of the 64. David Rosenwald of Commodore was most helpful in providing hardware and software. □

valFORTH™ for Atari* 400/800

Professional Software for the Hobbyist

VALPAR INTERNATIONAL

FORTH has been used for years by ATARI* and others in programming their arcade games. FORTH is *fast,* 15-20 times faster than BASIC, and can make use of every capability for your computer. And it's no longer the province of the professional programmer! With valFORTH and the additional packages described below, you can create programs in an afternoon that would previously have taken weeks of hard work!

WHAT? YOU DON'T ALREADY KNOW FORTH?

Then take advantage of our special offer on *Starting Forth* by Leo Brodie. Widely acclaimed as the best book available on the subject, this entertaining treatment of Forth will make you comfortable with this exciting language quickly and easily. When you order *Starting Forth,* you get a free copy of our "Notes for the valFORTH User," including references, by page, to *Starting Forth.*

These are the utilities developed by Valpar International's software specialists and used to create our commercial software products.

Coming Attractions:
* TARGET COMPILER
* 3D WORLD

For more information *fast* and a 4TH ♥ IF HONK THEN bumpersticker, send 25¢ and a self-addressed, stamped envelope.

valDOS NEW! By Popular Demand!

valDOS. Now you can use your valFORTH system to read and write normal Atari DOS Files created with valDOS or other sources. Also includes valDOS File Editor for creating and reading FORTH Source Code without "screens." (Not a general file editor.)

(Over 25 pages of documentation. Requires valFORTH.)

valFORTH™

Package contains: fig-FORTH kernel with mathematical and stack operations machine-coded for higher speed than normal fig-FORTH; line editor AND screen editor, debugger, sound and graphics commands, floating point, advanced 6502 assembler, diskcopiers, and much more! (Over 110 pages of documentation)

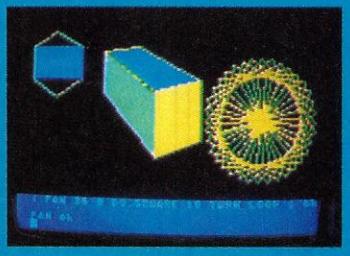
GENERAL UTILITIES AND VIDEO EDITOR

Utilities: 4 array types, 4 case types, text on graphics 8, extensive string manipulation and keyboard input, STICK & PADDLE, randoms, bit manipulation, and much, much more.

Editor: *fast, powerful, complete* valFORTH screen editor 1.1. A professional-quality tool that makes editing a pleasure.

(Over 60 pages of documentation. Requires valFORTH.)

PLAYER-MISSILE GRAPHICS, CHARACTER EDITOR, & SOUND EDITOR



Player-Missile: Create, move, color, change images of and bound players and missiles with high level commands. Full support of 5th player, multicolor players, etc. etc. All critical sections in machine code.

Character Editor: Compose character sets with joystick. Simultaneous display of created characters. Make images for players and missiles.

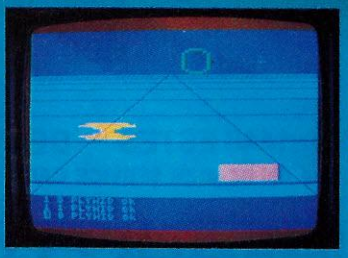
Sound Editor: Simple independent control of all four voices (one joystick per voice) and audio-control register. Create any single-setting sound with graphical and tabular readout.

(Over 35 pages of documentation. Requires valFORTH.)

DISPLAY FORMATTER

Fast, simple creation of all types of display lists, with automatic 4K boundary jumping. Automatic or user controlled memory allocation, and formatting for horizontal and vertical scrolling, and display list interrupts.

(Over 30 pages of documentation. Requires valFORTH.)



TURTLE & valGRAPHICS™ AND ADVANCED FLOATING POINT ROUTINES

All graphics modes supported — even GTIA and "7+". Draw and fill commands *faster* and *smarter* than Basic. "Turn-toward" for "chasing" and vanishing point effects; point labeling, etc. Also SIN, COS, ATN, ATN2, etc. added to floating point.

(Over 35 pages of documentation. Requires valFORTH.)

Text Compression and Auto Text Formatting

A unique, two-part utility!

- Text Compression allows the packing of text into much less space than normally required. Useful for wordy Adventure games, "artificial intelligence," etc.!
- Auto Text Formatting takes both normal and compressed text and routes it to the video screen "windows."

(Over 20 pages of documentation. Requires valFORTH.)

valFORTH alone requires 24K
valFORTH plus one or more packages requires 32K minimum
Memory requirements include 10-12K working space
All products are now on non-protected disks
Over 350 pages of detailed documentation!

valFORTH	$45.00
General Utilities and Video Editor	40.00
Player Missile Graphics, Character Editor, and Sound Editor	40.00
Display Formatter	35.00
Turtle and valGraphics and Floating Point Routines	45.00
Text Compression and Auto Text Formatting	35.00
valDOS and valDOS File Editor	45.00
Heavy-Duty Professional Binder (provided free when ordering 3 or more packages at one time)	13.00
Starting Forth	15.95

Plus Shipping and Handling
VISA and MASTERCARD accepted

VALPAR INTERNATIONAL
3801 E. 34TH STREET
TUCSON, ARIZONA 85713
Call Toll-Free 800-528-7070 In Arizona call (602) 790-7141

Principal Software Authors: Stephen Maguire and Evan Rosen

Atari is a trademark of Atari, Inc., a division of Warner Communications.

CIRCLE 306 ON READER SERVICE CARD

ALF COPY SERVICE

FAST • RELIABLE • LOW COST

If you produce software, ALF's disk copying service is the quick, convenient answer to your disk duplication needs. Most orders are shipped in less than a week. Every disk we copy is verified bit by bit and guaranteed 100% flawless. Standard formats include Atari, Apple (including nibble-copy-proof and double-boot formats), IBM, and TRS-80.

Our "no frills" pricing means you don't have to buy extras you don't need—set-up charges from **$10**, copying from **30¢** per disk. Of course, we have the frills too—including custom printing and packaging. Call us today for complete details.

BLANK DISKS

Bulk pack boxes of 100: 5¼", 1S DD, unlabeled, with hub ring. Sleeves 7¢ extra. Add $2.50 shipping per hundred.

NASHUA (1S SD)	$1.55
3M	$1.65
MEMOREX	$1.65
CDC	$1.65

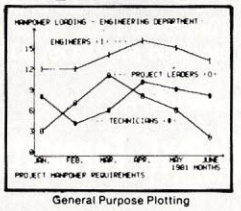
ALF (303) 234-0871 1448 ESTES DENVER, CO 80215

CIRCLE 104 ON READER SERVICE CARD

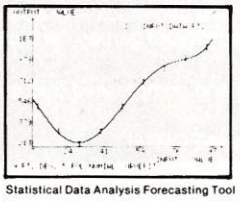
THE SUPERPLOTTER©

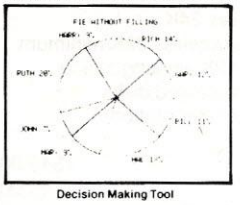
version 2.2

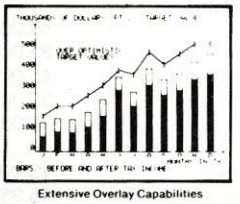
For use with Apple™ Computer Systems



General Purpose Plotting


Statistical Data Analysis Forecasting Tool


Decision Making Tool


Extensive Overlay Capabilities

The Superplotter is a highly versatile business, engineering, educational, math and graphics applications package featuring:

Standard Bar Graphs•Point and Line Graphs• Graphics Display of any Mathematical Function• Least Squares Polynomial Curvefit Generation• Keyboard Image Shape Tables and User Tutorial•Automatic Graphics Disk Storage and Recall•Data File Editor•Automatic Disk Storage and Recall of Editor Data Files•Overlay Modes•Graphics Screen Text Editor

Data may be input directly or from previously generated data files. Comprehensive documentation is provided including printer dump instructions and directions for accessing data bases created by other programs. Requires Applesoft and one DOS 3.3 disk drive.

$69.95

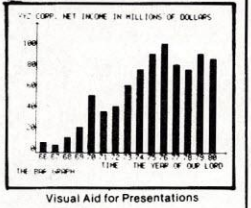
See your local dealer for a demonstration or order direct from:

Dickens Data Systems

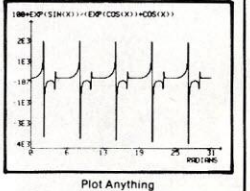
478 Engle Dr. / Tucker, Ga. 30084 / (404) 491-7905

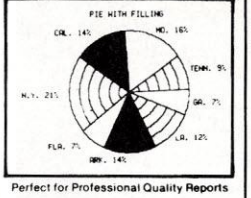
outside Georgia: (800) 241-6753 ext. 503

C.O.D., VISA, & MasterCard accepted.
Mail Orders: Add $2.50 for shipping and handling ($5.00 outside the USA)



Visual Aid for Presentations


Plot Anything



Perfect for Professional Quality Reports

Plot Keyboard Characters on Any Graphics Display Simply

CIRCLE 159 ON READER SERVICE CARD

7 Years Ago in creative computing

The November 1975 issue was almost entirely devoted to the impact of the computer on society. In the lead piece, an interview with Senator John Tunney, he expressed the opinion that in Presidential elections, computerized projections should not be announced until all polls have closed. He said "In 1964 and 1972, for example, I believe that voters in the west, after hearing projections of Presidential landslides, lost interest and didn't vote. This absenteeism especially affects statewide and local races and issues." Prophetic words. Tunney was defeated four years later for probably those same reasons.

We published the results from a major survey of public attitudes towards computers. Many results were not surprising, but one that was was that nearly one-fifth of the respondents believed that most errors were made by the computers themselves and not by programmers and operators. Let's hope that computer literacy has improved a bit by now.

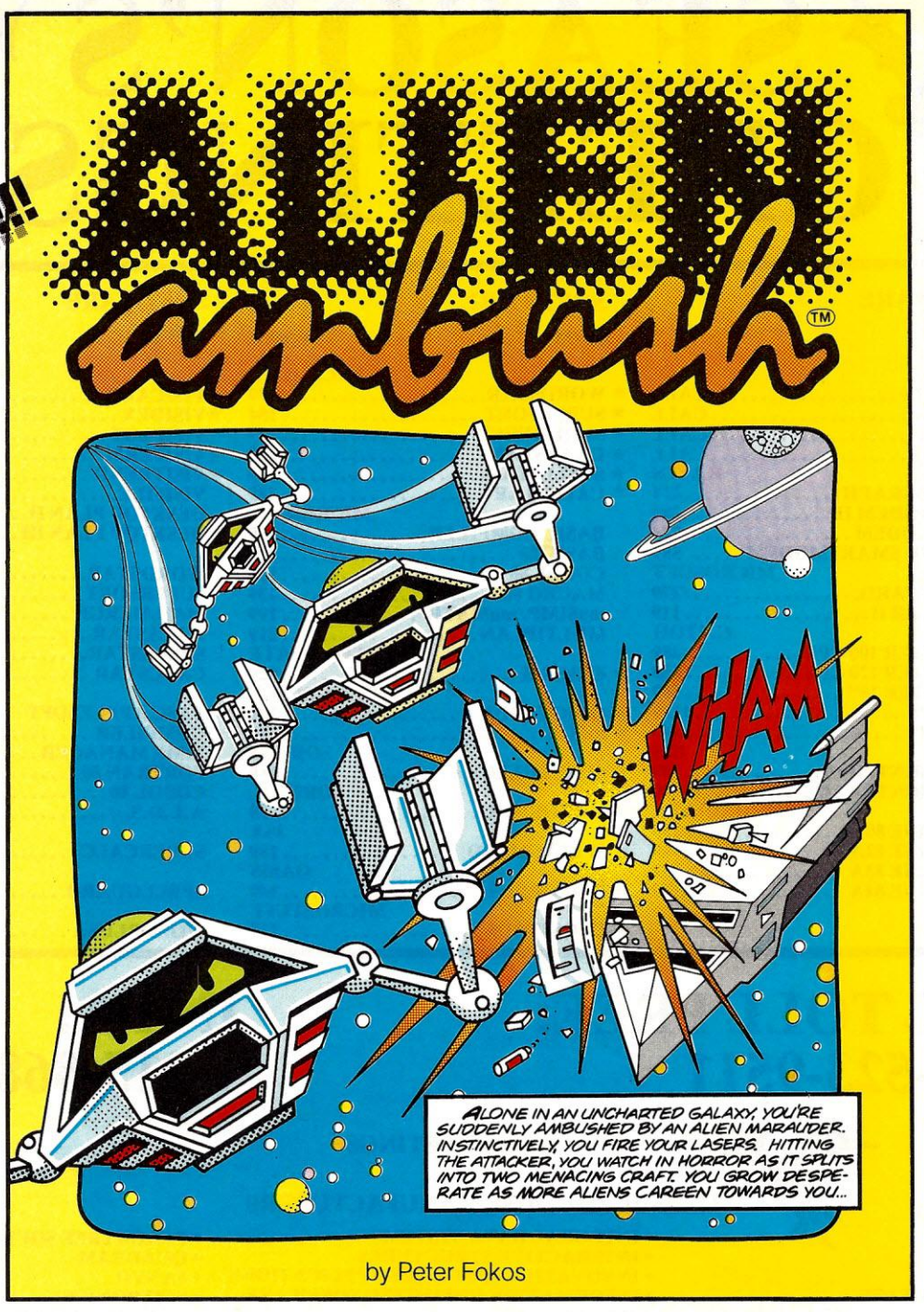
Terry Ireland and Norm Glick wrote a wonderful piece, "Eclectic Programming Languages," in which they longed for intuitively extensible languages. "Perhaps," they said, "the ultimate instruction will be, "You know what I want. Do it!"

I visited Terry recently and he felt that Ada and Pascal were hardly steps in the right direction, and did not encourage new classes of users to learn about computers.

In that issue we reviewed the first episodes of *Space: 1999*, a new TV show (lasted two seasons). We speculated that videodiscs would be commonplace in 5 to 10 years (we were wrong). We mentioned the newly-formed Micro-8 User Group for people building computers with the Intel 8008 (not 8080) chip (it lasted 1½ years). And we announced Computer Recreations, a system like The Source and Micronet but five years too early.

Craig Johnson's monster Span-O-Vision computer predicted that the height of the public's negative reaction toward computers would occur in 1985 when a computer would erroneously schedule 9 million reservations in Yellowstone Park causing the great camper wars. We'll see. □

NOW, also available in Atari format!!!



You haven't lived until you've died in space.

And here's your chance.

Software author Peter Folkos has created Alien Ambush, a space age nightmare. It's a hi-res, full-color arcade game, fiendishly written to give those nasty aliens every advantage.

So if you have access to a 48K Apple* with DOS 3.3 or a 16K Atari 400/800** with a disk drive, and you're hot for some new thrills, Alien Ambush was written for you. But be warned: it just got a lot tougher to survive in space.

*Apple is a trademark of Apple Computer, Inc. **Atari, Atari 400 and Atari 800 are trademarks of Atari, Inc.
Distributed exclusively by Micro D, 17406, Mt. Cliffwood Circle, Fountain Valley, Ca. 92708 (714) 540-4781

CIRCLE 203 ON READER SERVICE CARD

SEASON'S GREETINGS

HARDWARE

FRANKLIN	CALL
ALTOS	CALL
IMS	CALL
VIC 20	CALL
HAYES	
CHRONOGRAPH	224
MICROMODEM II	289
SMARTMODEM	224
1200 BAUD SMARTMODEM	589
MICROSOFT	
Z80 SOFTCARD	279
ENHANCER II	119
C. ITOH	
PROWRITER 100 CPS	489
PROWRITER 120 CPS	639
PROWRITER 15"	789
F10-55 CPS	1799
F10-45 CPS	1449
IDS	
PRISM PRINTER 80	789
PRISM PRINTER 132	1689
OKIDATA	
MICROLINE 80	359
MICROLINE 82A	489
MICROLINE 83A	739
MICROLINE 84A	1179

SOFTWARE

CP/M ★ IBM

MICROPRO	
★ WORDSTAR	279
★ SUPERSORT	154
★ MAILMERGE	89
★ DATASTAR	239
★ SPELLSTAR	149
★ CALCSTAR	189
MICROSOFT	
BASIC COMPILER	299
BASIC 80	279
COBOL 80	559
MACRO 80	139
muSIMP/muMATH	199
MULTIPLAN	219
ASHTON-TATE	
★ dBASE II	529
FOX & GELLER	
★ QUICKCODE	249
★ dUTIL	68
SORCIM	
★ SUPERCALC	189
FORCE II	
MATHSTAR	99
ISA	
★ SPELLGUARD	189
OASIS	
★ WORDPLUS	149
MICROSTUFF	
★ CROSSTALK	117

SOFTWARE

APPLE

VISICORP	
★VISICALC	184
★VISIDEX	184
VISIPLOT	158
★VISITERM	79
★VISITREND	239
VISIFILE	184
DESKTOP PLAN II	184
★DESKTOP PLAN III	184
MICROPRO	
WORDSTAR	224
SUPERSORT	119
MAILMERGE	79
DATASTAR	189
SPELLSTAR	129
CALCSTAR	139
MICROSOFT	
TASC APPLESOFT COMPILER	149
TIME MANAGER	119
FORTRAN 80	149
COBOL 80	539
A.L.D.S.	99
SORCIM	
SUPERCALC	189
ISA	
SPELLGUARD	189
OASIS	
WORDPLUS	149

CALL TOLL FREE: 1-800-523-9511

IN PA: 1-215-868-8219

SEASON'S GREETINGS
TO
THE MICROHOUSE MANUFACTURERS

- ALTOS
- AMDEK
- ANADEX
- ASHTON-TATE
- BAYAD
- CALIFORNIA COMPUTERS
- C. ITOH
- COMSHARE TARGET SOFTWARE
- DENVER SOFTWARE
- EAGLE SOFTWARE
- ELEPHANT
- EPSON
- FORCE II
- FOX & GELLER
- FRANKLIN
- HAYDEN
- HAYES
- INTEGRAL DATA SYSTEMS
- INTERACTIVE STRUCTURES
- INNOVATIVE SOFTWARE APPLICATIONS
- INFORMATION UNLIMITED SOFTWARE
- MAXELL
- MICROPRO
- MICROSOFT
- MICROTEK
- MORROW
- MOUNTAIN COMPUTERS
- M&R
- MICROSTUFF
- NEC
- NOVATION
- OASIS
- OKIDATA
- PERFECT SOFTWARE
- PEACHTREE SOFTWARE
- QUADRAM
- SANYO
- SCITRONICS
- SILICON VALLEY SYSTEMS, INC.
- SORCIM
- SORRENTO VALLEY ASSOCIATES
- SYNETEX
- SYSTEMS PLUS
- TCS
- TELEVIDEO
- VENTEL
- VIDEX
- VISICORP
- WABASH
- ZENITH

DEALERS INQUIRIES INVITED

MICROHOUSE

1444 LINDEN ST./P.O. BOX 498, BETHLEHEM, PA 18016

PRICES AND AVAILABILITY SUBJECT TO CHANGE

CIRCLE 204 ON READER SERVICE CARD

HOLIDAY PACKAGES

CALL US ABOUT YOUR FREE GIFT WITH PURCHASE

creative computing equipment evaluation

High Quality Hi-Res

James L. Hockenhull

Many computer users have been attracted to the Apple II because of its ability to produce color video graphics. Those users whose visual ambitions go somewhat beyond zapping the Klingons will probably be interested in obtaining the best possible display of Apple video.

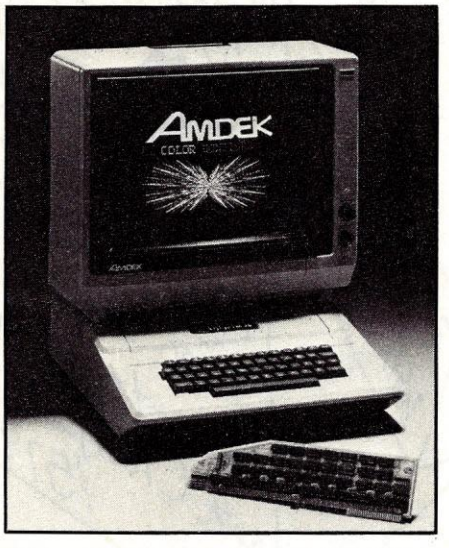


Figure 1. The Amdek Digital Video Multiplexor (DVM) board (foreground) for the Apple II, and the Color II 13" red-green-blue (RGB) monitor.

An off-the-shelf Apple can produce images on two types of hardware: regular television sets through a radio-frequency (RF) modulator, and monitors fed by the composite video signal available at the Video Out jack.

The first of these is adequate for home entertainment, but the RF modulator, being in essence a tiny TV transmitting station, is subject to all manner of interference, causing jitter, ghosting, and general degradation of the image.

A video monitor, gives a much more stable picture as the computer signal is piped directly into the circuitry of the monitor. However, image quality is highly dependent upon the quality of the monitor and its ability to make sense out of the Apple video signal which deviates significantly from the standards with which a monitor is designed to work.

The best monitors can give quite a good picture; the worst are hardly better than television sets. Some will not accept the Apple video signal at all.

Top-quality professional graphics devices, those used with mini and mainframe computers, do not use a composite video signal. Rather they work with three separate signals, one for each of the color guns in the display tube—red, green, and blue, hence the acronym RGB. The Amdek Corporation (formerly Leedex) of Arlington Heights, IL has made this professional display technology available to Apple II users with their Digital Video Multiplexor (DVM) and Color II RGB monitor.

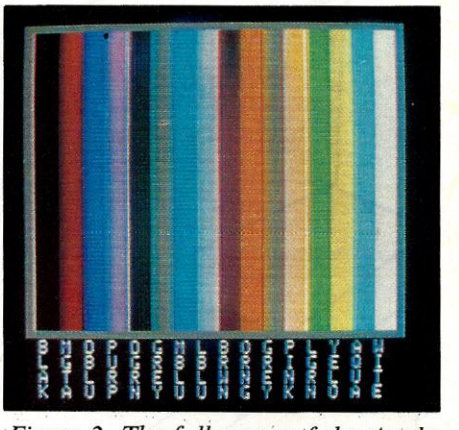


Figure 2. The full range of the Apple lo-res colors as displayed on a composite video monitor.

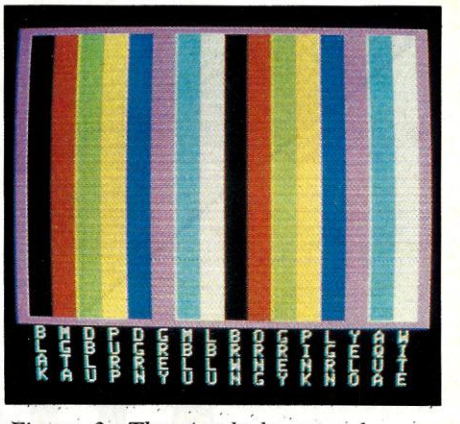
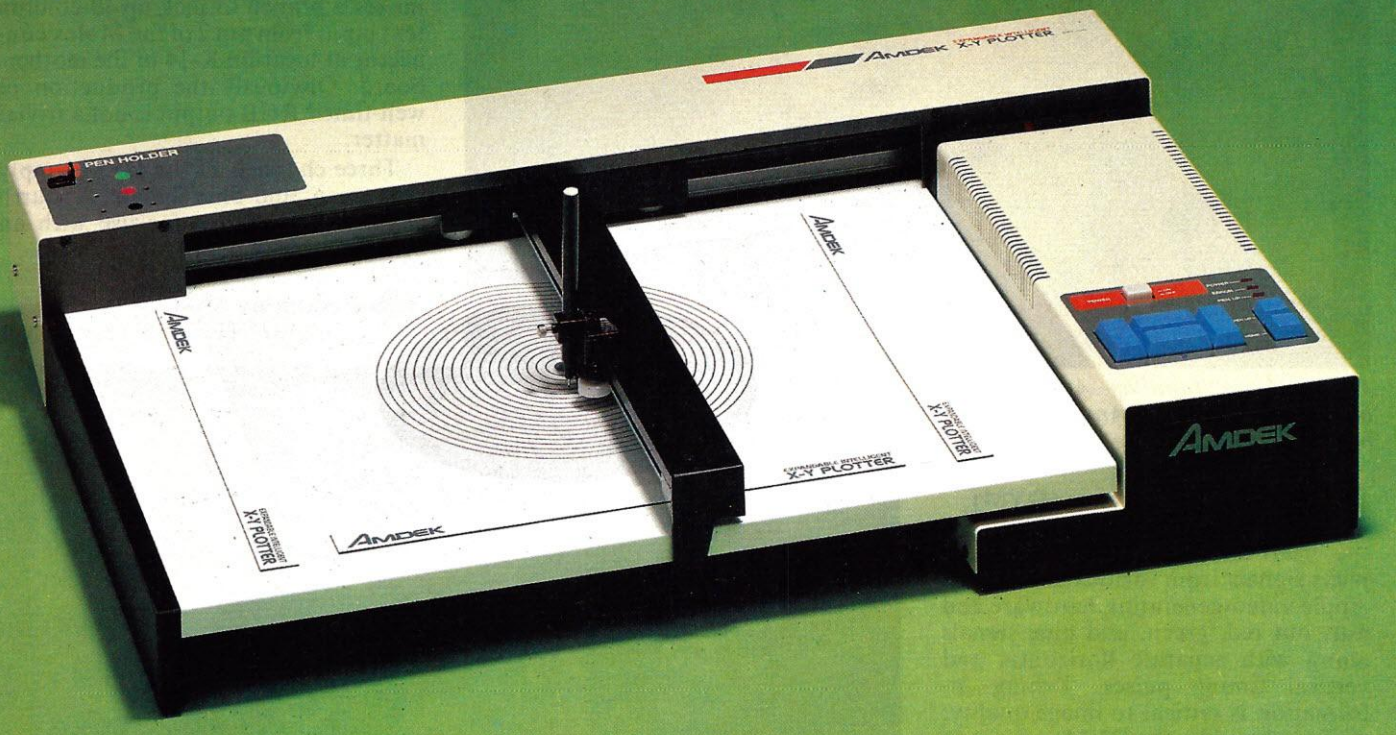


Figure 3. The Apple lo-res colors as they appear on the Amdek Color II red-green-blue (RGB) monitor. Colors are limited to black, red, green, yellow, magenta, cyan, and white. The Amdek text is clear and free from color fringes.

James L. Hockenhull, S.W. 205 Snowdrift, Pullman, WA 99163.

NEW LOW-COST ENGINEERING/BUSINESS PLOTTER



Cost-effective "originals"

The Model DXY is an economical multi-pen, X-Y coordinate plotter that produces hard copy graphics in minutes for all types of business applications and technical disciplines. Priced at under $1000, it's compatible with the IBM, Apple and other personal computers. It has built-in software (expandable ROM) to interpret "Basic" commands. Just call, or write for complete specifications on the Model DXY Plotter. Ideal for end-user or OEM applications.

- 10″ x 14″ effective plotting range.
- Centronics interface for easy connection to your computer.
- Pens, penholders, chart hold-downs, and dust cover are included.
- Charts on popular graphics media including vellum and mylar.

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786

AMDEK CORP.

Amdek . . . your guide to innovative computing!

CIRCLE 107 ON READER SERVICE CARD

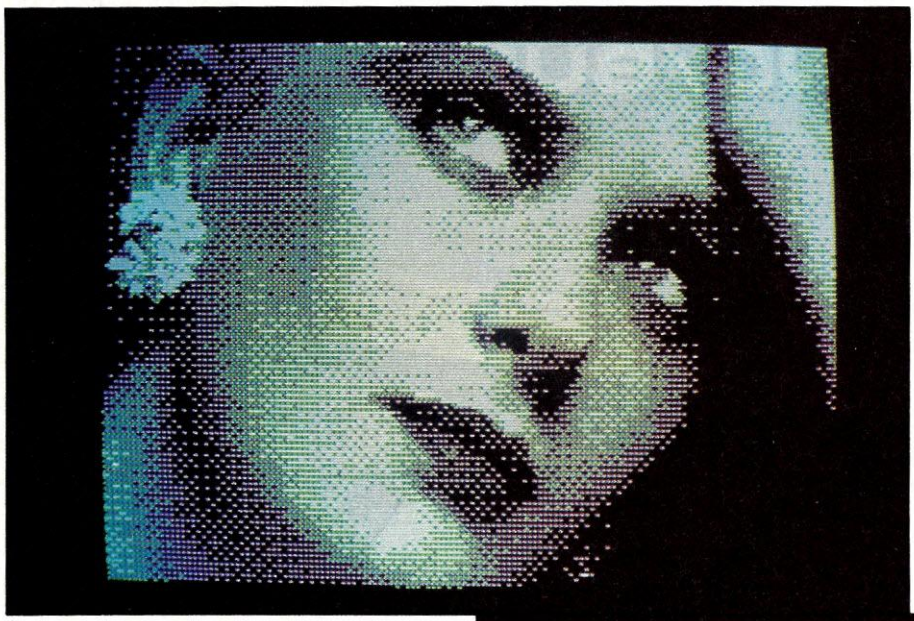


Figure 4. A familiar Apple hi-res image, shown on the Amdek Color II monitor, driven by the DVM board.

Digital Video Multiplexor (DVM)

The DVM, which retails for $199, is the heart of the Amdek system. It picks signals from various parts of the Apple video-generating hardware and puts out red, green, and blue signals along with separate horizontal and vertical timing pulses. Timing information is critical to image quality; that produced by the DVM appears to be much closer to industry standards than that produced by the Apple.

The main printed circuit board of the DVM is a large one. Eleven inches long, it extends well toward the front of the computer case, with its top front corner cut off to clear the case cover. The board carries 37 integrated circuits (ICs) mounted in sockets.

In addition there are two satellite "daughterboards" which fit between certain of the Apple ICs and the motherboard. A cable connects the daughterboards to the main DVM card. A second cable supplies output to a 9-pin D-type connector but also makes a branch to pick up 40-column text input from pin 2 of the Molex connector at location K-14 of the motherboard. Obviously the production of well-timed RGB output is not a trivial matter.

Three channels of the DVM supply red, green, and blue signals. A fourth channel is provided for use with an 80-column text board.

High-Resolution Monitor

The Color II high-resolution monitor superficially resembles a nicely-designed 13″ color television set. Its beige and black plastic case measures 16⅞″ x 14½″ x 15″, and its feet are spaced so that it will just fit on top of the Apple case. It retails for $899.

Figure 5. The image as it appears on a high quality video monitor.

A look at the controls makes it apparent that the Color II is not just another TV: on-off, contrast, brightness, and vertical hold. Period. There is no volume (there is no speaker), no color, no tint, and, of course, no channel selector. This is a specialized machine.

The documentation supplied with

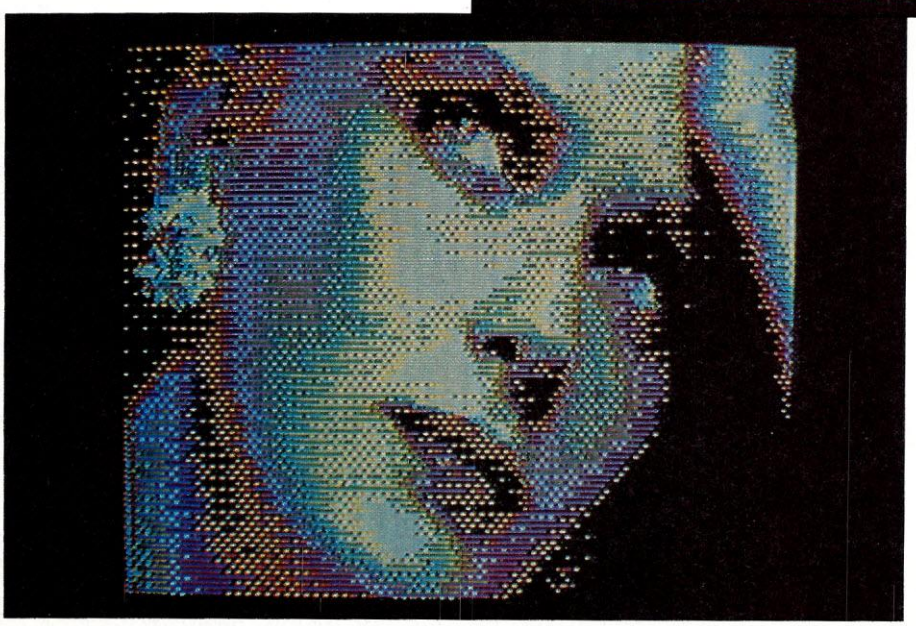


Figure 6. The same picture on a television receiver, driven by a popular radio frequency (RF) modulator.

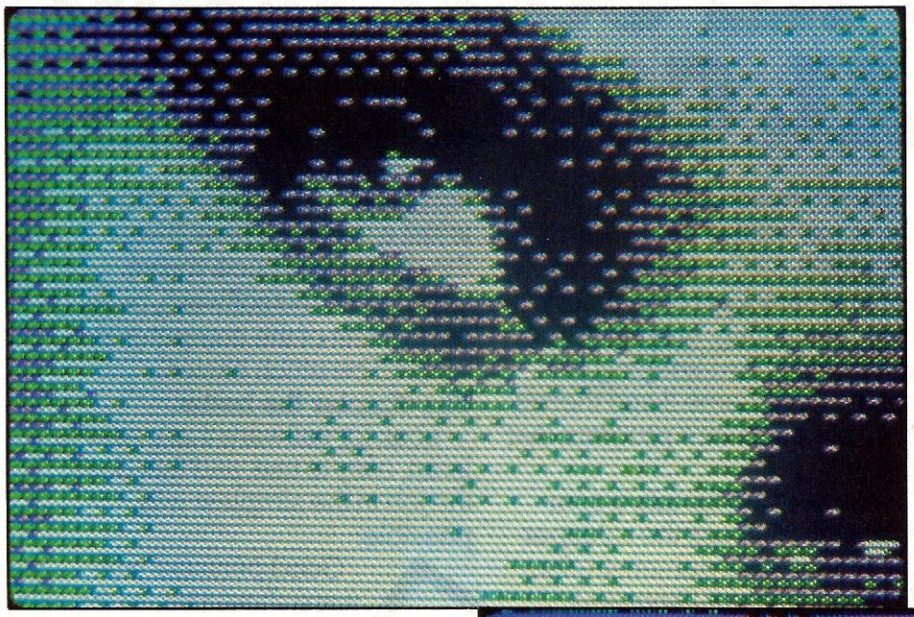


Figure 7. A close-up of the Amdek image.

the Color II is "consumer oriented," disappointingly so, in my opinion, considering the professional quality of the monitor itself. Seven of the eleven pages in the booklet are taken up with such matters as location of controls (since there are only five controls, this is not too complicated), how to turn the set on (ditto), and several pages of precautions, with little cartoon figures beset by sweat-beads, X's, and exclamation points illustrating such warnings as "Do not hold anything by the power cord" and "Do not apply a shock by dropping, crushing, etc." I mention this simply because I believe that those who purchase expensive, professional-quality equipment expect, deserve, and *need* professional-quality documentation.

The last four pages get down to facts, describing the signals required by the Color II, giving a pin-out of the input connector, and offering diagnostics in case the input signal is not correct.

Input is through a standard Type-I 8-pin video connector which expects red video, green video, blue video, horizontal sync, vertical sync, and ground — exactly the signals produced by the DVM board.

Installation and Setup

Installation of the DVM involves more than simply dropping the card into a peripheral slot; integrated circuits must be removed from the motherboard and inserted into sockets on the daughterboards which, in turn, must be inserted into the motherboard. One who has never handled ICs would be well advised not to learn by practicing on the computer.

Figure 8. A close-up of the video monitor image.

On the other hand, anyone with even a small amount of experience should have no trouble with the installation, although the price of an IC puller and inserter should be figured into the total cost.

Having issued these warnings, I will say that installation is straightforward and shouldn't take much more than twenty minutes.

The manual includes instructions for connecting to a Videx Videoterm

Figure 9. A close-up of the TV image. Notice the dramatic differences in resolution.

IF YOU'RE CONFUSED PERSONAL COMPUTER,

At this moment, there are no less than 50 personal computers on the market. And more are being introduced every day.

On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.

Computers come in two parts. You have to buy both.

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

Computers come in two parts.

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration, keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.

Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

ABOUT BUYING A HERE'S SOME HELP.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family. PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

PFS:FILE. The simplest way to get organized.

Basically, FILE works like a paper filing system, without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

FILE lets you arrange your information in "forms" you design yourself. So you can get at and really use your information in ways never before possible.

What's more, FILE lets you change the original form without having to redo the information on it.

PFS:REPORT. Making the most of your information.

REPORT summarizes the information on your forms so you can use it to analyze, plan and make better-informed decisions.

With REPORT, you get presentation-quality reports—sorted, calculated, formatted and printed—automatically, in seconds.

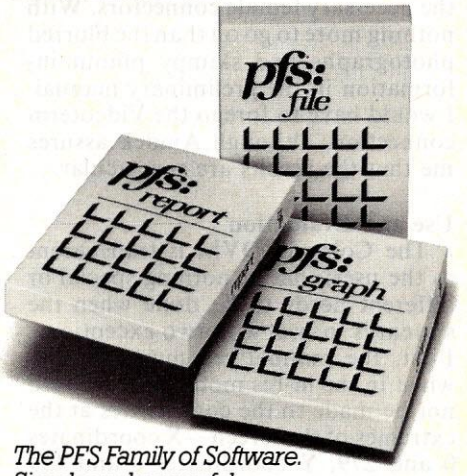
PFS:GRAPH. Instant pictures.

GRAPH gives you presentation quality bar charts, line graphs, and pie charts, in black and white or color, on paper or the computer screen. To get a clearer picture of things and spot trends instantly, you simply enter your information and specify the kind of graph or chart you want. GRAPH does the rest.

You can also mix and match line and bar graphs, or even stack or compare up to four bar graphs simultaneously.

And GRAPH will work with PFS:FILE, VisiCalc® files, or data entered directly into the computer.

Best of all, compared to the cost of hand-drawn graphics, GRAPH can save you enough money over the course of a few months to pay for the computer it runs on.



The PFS Family of Software. Simple and powerful.

Send for our Free PFS SOFTWARE CATALOG.

It'll tell you more about the PFS Family of Software and how to use it.

It's free. And all you have to do to get one is return the coupon below, or see your participating PFS dealer.

The PFS Family of Software.

We've already made computers simpler to use.

Now we're making them simpler to buy.

pfs®

FREE PFS SOFTWARE CATALOG

Name _____

Address _____

City _____

State _____ Zip _____

I plan to use a personal computer:

☐ at home ☐ at work ☐ both.

Mail to: PFS, 422 Aldo, Santa Clara, CA 95050

CC 1/83

®PFS is a registered trademark of Software Publishing Corporation, 1901 Landings Drive, Mountain View, CA. 94043. The PFS Family of Software currently runs on all Apple® II and Apple III computers. ®Apple is a registered trademark of Apple Computer, Inc. ®VisiCalc is a registered trademark of VisiCorp Personal Software.

CIRCLE 267 ON READER SERVICE CARD

80-column text card, requiring the soldering of three male Molex pins to the Videoterm. These pins were not included with my evaluation unit, nor was the connecting cable fitted with the necessary female connectors. With nothing more to go on than the blurred photographs and skimpy pinout information in the preliminary manual, I would have to forego the Videoterm connection, although Amdek assures me that the results are spectacular.

Use and Evaluation

The Color II/DVM is transparent to the user; that is, nothing special or different needs to be done when the system is in use, with two exceptions. First, the manual recommends that, when in the hi-res mode, plots should not be made to the coordinates at the extremes of the screen—X coordinates 0 and 279, Y coordinates 0 and 159 (mixed mode) or 191 (full screen mode). When references are made to these coordinates odd "artifacts" may appear on the screen. This means that the graphics display area is reduced slightly and that minor modifications may have to be made in existing programs.

Second, the three color channels are software selectable. Any or all of the guns can be turned on or off by accessing the appropriate memory locations, in much the same way that Apple screen modes are selected.

Shutting off a color gun will, of course, have a pronounced effect on a graphic image, but if the red and blue channels are defeated, the Color II becomes, in effect, a green-phosphor monitor which is wonderfully easy on the eyes for text work. (An extensible language, Forth, for example, allows commands such as GREEN and COLOR to be added to the language system to take full advantage of this capability.)

"That damn computer thinks it knows it all!"

The Pros

The first thing I noticed when I brought up the Amdek system was its silence. I spend a lot of time in front of cathode ray tubes (CRTs) and I'm often made uncomfortable by the high-pitched whine so characteristic of TVs and monitors. The Color II is silent.

Silence is golden, but graphics is where the virtues of the Color II/DVM really become apparent. The image, first of all, is stable. It doesn't flicker or twitch or crawl or herringbone but sits there rock-steady like the image on a mainframe terminal. If noise should appear it can usually be eliminated by adjusting a trim pot on the DVM board.

And, oh, the color! I have seen my graphics work on everything from discount house television sets to studio monitors, but I have never seen anything like the Color II/DVM system. The colors are deep and rich; the blue is that blue usually obtained only by oversaturating a regular monitor, the orange is very close to red. Yet when switching back to the text mode there are *no* color fringes around the characters.

However, least we think we're in heaven, of the 15 lo-res colors, only black, red, green, yellow, magenta, cyan, and white are available. (See Figures 2 and 3.)

The screen image is not only stable and colorful but has extremely sharp resolution and focus, a good thing since the manual gives no hints as to how focus or convergence may be adjusted.

I am a computer artist (for want of a better term). I make my work portable through photographic reproductions, usually 35-mm color slides shot from a video screen. It was natural, then, to test the Color II by shooting a group of slides for comparison with those taken from other devices. The slides show, rather dramatically, the superior clarity and resolution of the Amdek when compared to identical pictures from a high quality composite video monitor of the same screen size. Of course there is absolutely no contest between the Color II and a standard television receiver. (See Figures 3-8.)

It would be nice to report that I preferred the Amdek slides in all cases, but occasionally their clarity was outweighed by the broader range of colors available on composite video monitors. The Color II slides also showed noticeable "barrel distortion"—all four sides of the image being markedly convex. This surprised me as the actual screen image appears to be quite rectilinear. The distortion may be due to some optical effect between screen and camera or it may be that the squareness of the Color II is more psychological than actual. (Some amount of distortion is unavoidable when shooting from any CRT.) These complaints notwithstanding, the slides from the Color II were excellent.

The Cons

Someday, perhaps, a perfect product will be made, one about which nothing negative can be said. To the best of my knowledge, that day has not arrived. I do have a few other minor grouses about the Amdek system which I shall now list in no particular order.

My eyes find the 13″ screen too large for comfort when the Color II is sitting on top of the Apple. I have had to move the unit to the table behind the computer where it serves very well.

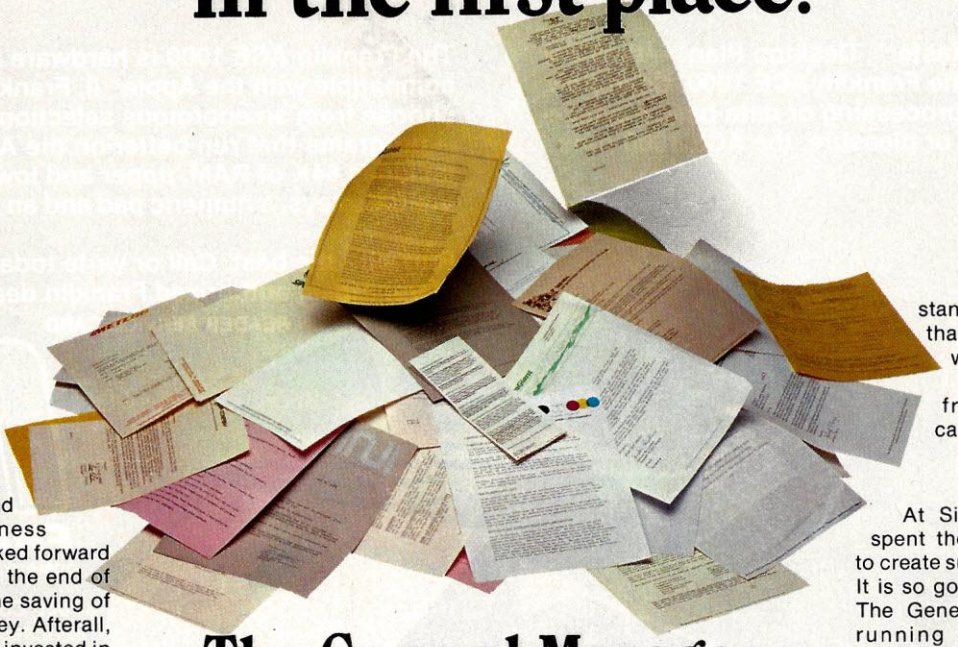
The Color II does not provide a way to kill the color for black and white work. Because of the unusual Apple color structure, a white rectangle may have one green side and one violet. Put another way, the accuracy of the Color II points up the oddities of Apple color video output. Sometimes this can be annoying.

The output connector of the DVM does not fit neatly in any of the access slots at the rear of the Apple; it simply hangs out at the end of its cable. This may seem like a minor matter, but it is a jarring bit of inelegance in a well-designed system.

And, of course, expense must rear its ugly head. The Color II/DVM combination is not cheap, listing for just about what a bare-bones computer costs. For what market is the system targeted? Amdek estimates that from 10% to 15% of all Apple users are involved in serious graphics applications and will be potential customers. Doubtless, others will be able to afford the best for their more recreational pursuits.

Having voiced the preceding complaints, I shall conclude by saying simply that it doesn't get any better than this. If you don't like Apple graphics on the Amdek Color II/DVM system the chances are that you won't like Apple graphics anywhere. Both devices are well conceived, free of frills, and meet or surpass their advertised claims. I recommend them highly to those who want the finest in display devices. □

The reason you bought a computer in the first place.



The General Manager

The Agony... You expected your new computer to perform miracles — to bring order out of chaos. You looked for it to organize and manage your business information. You looked forward to the end of errors, the end of frustration . . . and the saving of time, effort and money. Afterall, that's the reason you invested in a computer in the first place. Yet, there it sits. Nothing.

...and the ecstasy.

Well, your computer *can* perform all the miracles you hoped for. It needs just one professional addition. **The General Manager.**

The General Manager is what the computer industry calls a data base management program (DBM). In everyday words — it allows you to organize, store, file, find, save, retreive, interrelate, control and print out all or selected parts of your information. The result: your information, or data, is managed totally, completely, automatically.

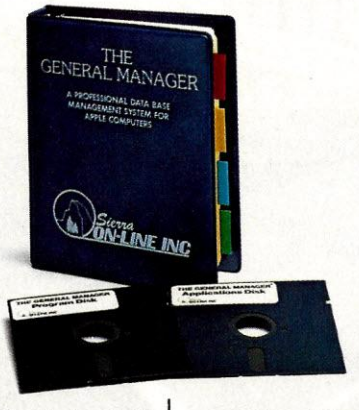
Ordinary

The ordinary DBM system expects your business to conform to its program design. So you must change your records, your forms, your way of having information cross-referenced, saved and . . . well, you almost end up with a different business! Certainly a more frustrating one.

Extraordinary

The General Manager on the other hand is extraordinary in the DBM field, because it makes no such demands on you. Instead, it lets you make demands on it! The General Manager was designed so that your business routines can be kept as individualized as you want . . . so your data is managed and delivered in the ways which are most useful, efficient and effective for you.

It works so easily and so well because of its "hierarchial" structure. This sensible "family tree" type of design starts with the main subject, then branches out to related information. You enter data on "Blank Forms" which you may construct to your exact needs. The data may be updated, deleted or modified to your heart's content. To know The General Manager will be to love it!



Power & Price

Nothing near the price of the General Manager (by hundreds of dollars) gives you all the power, features and benefits it does! At $229.95, The General Manager is the absolute value in its field.

Consider this: it supports 1 to 4 floppy disk drives (even hard-disk systems). It includes utility programs which others charge hundreds extra for. Upper and lower case characters in the data base are provided without need for additional costly hardware. If someone goofs, the "error message" is displayed in understandable English. There is an on-screen "Help" function available any time. It creates Applesoft usable files for your program needs. And many especially useful printing commands are built-in for greater flexibility. When you consider all these advantages, and more, we think your business sense will agree, there's no contest at any price.

The fantasy... Almost everyone claims user friendly documentation. The fact remains much of it is convoluted, complicated and defies understanding. You can't afford that! — for a program without excellent documentation is frustrating and basically useless.

...and reality!

At Sierra On-Line we've spent the time and the effort to create superb documentation. It is so good that you can have The General Manager up and running after the first two chapters! And after you're thoroughly at home with it, you can move on to the other chapters as you have need for the many additional functions and capabilities.

The reason you bought...

. . . a computer in the first place was, we know, twofold: for word processing (our Screen Writer program is the leader) . . . but mainly for information management. The General Manager is your powerful answer . . . the truly outstanding value in DBM's, bar none, at only $229.95.

For further information and ordering, see your computer dealer or contact us:

(800)344-7448

Sierra ON-LINE INC

SIERRA ON-LINE SYSTEMS, INC.
Business products division.
36575 Mudge Ranch Road
Coarsegold, CA 93614

*The General Manager, version 2.0 requires 48K Apple II or II+, 1 or more drives, DOS 3.3. Direct orders add $3.00 shipping/handling.

CIRCLE 253 ON READER SERVICE CARD

Franklin's ACE1000 Runs With The Best!

VisiCalc®, DB Master®, Desktop Plan®—they are all running on the Franklin ACE 1000. Cash flow, budgets, word processing or data base management, business or pleasure, the ACE 1000 runs with the best.

The Franklin ACE 1000 is hardware and software compatible with the Apple® II. Franklin users can choose from an enormous selection of programs —programs that run better on the ACE because it includes 64K of RAM, upper and lower case, VisiCalc keys, a numeric pad and an alpha lock key.

Run with the best. Call or write today for the name of your local authorized Franklin dealer.

CIRCLE 196 ON READER SERVICE CARD

Franklin ACE is a trademark of Franklin Computer Corporation.
Apple is a registered trademark of Apple Computer Inc.
VisiCalc and Desktop Plan are registered trademarks of Visi Corp.
DB Master is a registered trademark of Stoneware.

FRANKLIN
COMPUTER CORPORATION

7030 Colonial Highway
Pennsauken, NJ 08109
609-488-1700

creative computing software evaluation

Great Graphics Simplified

Brian Murphy

The best software programs are those which help you to explore the capabilities of your hardware, which open up new possibilities, and which stimulate your creativity. Stoneware's *Graphics Processing System* (professional version) for the Apple II is this kind of software.

Let's face it. The most attractive feature of the Apple II is its ability to put great high-resolution color graphics on the video screen. Who isn't impressed, walking into a computer store and watching an Apple II go through its paces for the first time, with the graphics which flash on the video screen. When Apple added the graphics capability to the Apple II, they built in a most effective sales device.

Once you have your Apple safely deposited in your home or office, the next impulse is to do something with it — to add some of those great graphics that you saw in the computer store. That's where the *GPS* comes in.

GPS saves you the trouble of learning the programming tricks (worthwhile as they are to know) in your Applesoft Tutorial and Applesoft Manual. Instead, you are called upon to master a step-by-step tutorial which *GPS* has written for the individual who shies away from programming. It is a short course you can master in three or four hours of work, and at the end graphics will flow from the tip of your light pen.

Actually, a light pen (Symtec's is specified) is only one way of operating the program. You have the options of using a joystick, game paddles, a HIplot or graphics tablet. For the purposes of this profile, we tried it with the joystick, light pen and Apple Graphics tablet. The tablet proved to be the quickest and easiest instrument to work with.

The best feature of the *GPS* package is its speed. It loads fast and brings up the options from its many and varied menus quickly, expediting your work. To make a menu selection, requires only that you guide the cursor, using your drawing instrument, over the option you desire. It lights up, and then, to choose it, all you do is press the pen down (or push the paddle button or touch the light pen ring).

The entire program, as you may have gathered, is menu driven. You access the branch menus from a main selection offering the options of Draw, Erase, Modify, Duplicate, Display, Group, Information, and Cancel. Draw is the default selection (the one you get if you don't guide your cursor to another selection before pressing the button).

The Draw Menu

In the Draw menu you do the actual creative work. Your options are freehand or line drawing, change of line color (more on color in a moment), erase, cancel and end. Freehand, of course, is the option that lets you draw whatever shapes you prefer. The only limit is the amount of memory you fill up as you draw. Freehand is the easiest option to choose when you have an Apple Tablet.

Making a freehand drawing using the game controllers or a joystick is awkward and the results are frequently unsatisfying, unless you were a champion Etch-A-Sketch user as a kid. Good results are obtained with the Symtec light pen.

The line option is more suited to the paddles. In this mode, the cursor leaves a dot on the screen where you press the button. You move to the next point and press the button and a line appears connecting the two points. Moving on from the second point a line will connect it to the third point when you press the button, etc. The only limit is the amount of memory you fill up. In the line mode you can create geometric figures or, if you gain skill in using the *GPS*, detailed line drawings to illustrate reports, etc.

A word about color. In the default mode, the line color in freehand or line drawing is white on a black screen. This translates to black on a white background if you decide to print hard copy of your graphics. Thus, if you are generating computer graphics to illustrate a report, you don't have to tinker with the color option.

If you use the color option, you have two whites, two blacks, a green, an orangy scarlet, and a light and a dark shade of blue with which to work. Some of the colors can be blended with others, if you select two at a time, but this process is better suited to the filling procedure, which we'll get to later. It is enough to say that you can put down scarlet, light blue, dark blue, white, and green lines. You can also place black lines on the screen, but you'll have one heck of a time seeing them.

After you have created one or two figures, you may decide that you don't like any of them. If so, you can choose the cancel option and the figures will disappear, the memory will be freed up and you can start over.

There is, however, the possibility that you are dissatisfied with only one line on one of your geometric figures. Using the

creative computing
SOFTWARE PROFILE

Name: Graphics Processing System

Type: Graphics generation system

System: 48K or 64K Apple II with Applesoft, disk drive, choice of joysticks, paddles, Symtec light pen, Houston Instruments Hiplot or Graphics tablet

Format: Disk

Language: Applesoft

Summary: Software that truly simplifies graphics.

Price: $99.95

Manufacturer:
Stoneware Incorporated
50 Belvedere St.
San Rafael, CA 94901

Brian J. Murphy, 133 Post Road Rd., Fairfield, CT 06430.

erase option, you can erase your line drawings, one line at a time. In the same mode, you can rub out portions of your freehand figures.

Modifying The Picture

With a finished figure, you now have the task of choosing the end option. This makes the picture you have drawn an "object," which is an important distinction in several ways. For example, in the Modify option of the main menu, you can take the object you have created and fill it in with solid color. You can combine blue with scarlet, any of the colors with white or black, or scarlet with green. In the blended colors, the hues are not solid; the effect is achieved by alternating horizontal lines of the colors you are mixing.

If you prefer, you can change the background color in the Modify/Color mode. If you opt for a white background, you can return to the Draw menu and, by selecting the color option from that menu, add new objects drawn in black. (You'll remember that a black line was invisible against a black background.) If you print hard copy of the result, you'll get what appears to be a negative image—white lines against a black background.

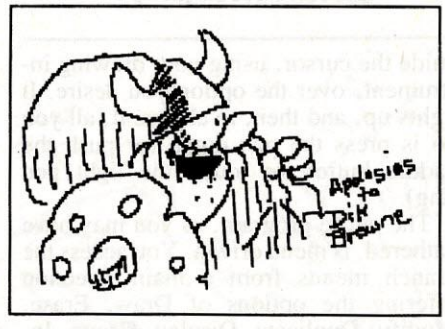
If you are drawing maps or charts, you can use the Modify/Color mode to give you an all-green or all-blue background, thus eliminating some of the labor of filling in color for large areas denoting sea or land and also saving precious memory.

While you are still in the Modify menu, you can choose to move an object using the Position option; to squeeze it, using the Proportion option; or to enlarge or reduce it, using the Size option. In fact, using the Size option you could, for example, make detailed drawings of many different objects, reduce them, and put them all in the same picture (switching back and forth between the Draw and Modify menus). Or, if you like, you can take one object from your picture and focus on it, omitting undesired objects from your finished product without having to erase.

If the positioning is okay, but the object appears to be out of kilter horizontally or vertically, you can rotate it, using the Rotation choice in the Modify menu. This leads to the interesting possibility of creating a series of pictures of the same object, by spinning the same picture around a single point of reference. A series like this looks nice in hard copy.

Finally, the Modify/Order option allows you to take the objects you draw and stack them on top of one another. For example, if you were to draw a picture of an apple tree, then of Adam and Eve, you could have them hiding coyly behind the tree.

We have arrived now at the only serious limitation of the program: the amount of memory it occupies. Chances are, if you are doing a complex freehand drawing, at some point the Apple II will beep and the text window will come up with the single, ominous prompt, "Memory Full." If you have a 16K RAM card (that is, if you have at least a 64K system) you press the button once to return to the main menu and select Cancel. Then you move the cursor off the screen entirely and hit any key. The screen will go blank. Then press the B key.



The screen will immediately light up again with the picture you have been working on. The difference is that it is now in the background; the program has put all the information in the 16K card, freeing up memory for more drawing. There are restrictions on what you do now. If you add an object to the picture and then try to use the Modify/Size option, the object will grow, but not the background, which includes all the objects you drew right up to the Memory Full statement.

The Display/Zoom Option

There are other manipulative tricks available. Using the Display/Zoom option, for instance, you can zoom an object by several orders of magnification and then return to the Draw menu to add detail. When you have finished, you can return to the Display/Zoom mode, elect not to zoom, and the picture, with your additions, will zoom back down to scale.

GPS comes with an extra diskette, containing the "Special Features," one of which is the text font. This font proved to be hard to manipulate; I found it very difficult to get the letters in a word to sit evenly and in line. Anyone who has struggled with transfer lettering know what I am driving at.

The problem is that, hard enough though it would be to keep all the letters level if you could see them, they remain unseen until you have guided them into place with your cursor. As I said, I found it very difficult, but I suspect that with more practice it can be mastered.

Also, on the Special Features disk is a Grid Maker, which does just that; it puts a grid of lines on the screen for use in preparing graphs. Once you store the grid on disk, it is treated by the *GPS* format as an object, to be enlarged, reduced or otherwise at will. This could be a valuable feature in preparing quick graphics to go with a word-processed report.

At last, skipping over other features and functions too numerous to detail here, we arrive at the important part, the storage to disk. Once your work is complete, you need only choose the Duplicate menu and select the Apple option. This will give you the opportunity to select a name and store the picture data on disk, ready for use in any Applesoft program. If it is hard copy you need, the selection of the Duplicate/Printer option will instantly set your printer to work duplicating your graphics onto paper.

This is one big software package for $99. The *Graphics Processing System* gives you a great deal of flexibility to draw what you want, in the detail and colors you like, and to get those graphics into your program the way you would want. To do the same job that the *GPS* program does in only a few minutes would take a great many program lines, much dot plotting and a great deal of time, armed only with the Applesoft Tutorial, fine as it is.

Stoneware sums it up claiming that what a word processing system is to text, or an advanced spreadsheet program is to numbers, *GPS* is to graphics. It's the simple truth. This program does not do tricks with shape tables, animation, animation paths and so forth, but for a business user who wants to add graphics to his word processor-generated reports quickly, to the teacher who wants to add graphics to his software and to the home user, who just wants to explore his hardware and his creativity, this program will be flexible and useful.

Graphics Magician

Have you ever wondered how adventure games like *Mummy's Curse* and *Cranston Manor* get all those pictures onto one disk? If you have taken the time to learn the graphics portion of the Applesoft Tutorial, you might have noticed that the pictures you make tend to use up a great many disk sectors. A picture weighing in at 33 disk sectors may not seem very large, but your Disk II diskettes can story only 496 sectors of information. That works out to about 15 pictures 33 disk sectors long.

Second: Have you ever wondered how

If you can find lower prices than ours, read their fine print.

Our fine print:

We guarantee every-thing for 30 days. No returns after 30 days. Defective software will be replaced free, other software returns are subject to a 15% restocking fee and must be accompanied by RMA slip. No returns on game software.

VISA and MasterCard accepted on all orders — no extra charge. COD orders accepted up to $300.

SHIPPING CHARGES: $3 for all prepaid orders, actual shipping charges for non-prepaids; $3 for COD orders under 25lbs. ($6 for over) plus a $4 surcharge; add 15% for foreign, FPO and APO orders. Californians add 6% sales tax, in L.A. County add 6½%.

Prices quoted are for stock on hand and subject to change without notice.

That's it.

16K RAM KITS.....13.95

Set of 8 NEC 4116 200 ns. Guaranteed one year.

DISKETTES

ALPHA DISKS.....21.95

Single sided, certified Double Density 40 Tracks, with Hub-ring. Box of 10. Guaranteed one year.

SCOTCH 3M

S.S.D.DEN 40 TRK	23.50
D.S.D.DEN 40 TRK	36.50

VERBATIM DATALIFE

MD 525-01, 10, 16	26.50
MD 550-01, 10, 16	44.50
MD 557-01, 10, 16	45.60
MD 577-01, 10, 16	34.80
FD 32 or 34-9000	36.00
FD 32 or 34-8000	45.60
FD 34-4001	48.60

DISKETTE STORAGE

5¼" PLASTIC LIBRARY CASE	2.50
8" PLASTIC LIBRARY CASE	3.50
PROTECTOR 5¼" (50 Disk Capacity)	21.95
PROTECTOR 8" (50 Disk Capacity)	24.95
DISK BANK 5¼"	5.95
DISK BANK 8"	6.95

ALTOS, NEC, & HP COMPUTER SYSTEMS

Call Alpha Byte for our low prices.

ATARI COMPUTERS

ATARI 800	659.00
ATARI 400 (16K)	$CALL
ATARI 810 DISK DRIVE	445.00
ATARI 850 INTERFACE	169.00
ATARI 410 PROGRAM RECORDER	75.00
JOYSTICK CONTROLLER	10.00
PADDLE CONTROLLERS	17.50
PERCOM DRIVE	759.00
STAR RAIDERS	35.00
MISSILE COMMAND	35.00
ASTERIODS	35.00
PACMAN	35.00
CENTIPEDE	35.00

INTEC PERIPHERALS RAM MODULES

48K FOR ATARI 400	199.00
32K FOR ATARI 800	85.00

PRINTERS

ANADEX 9501-A	1390.00
C-ITOH F-10 40 CPS PARALLEL	1390.00
C-ITOH F-10 40 CPS SERIAL	1390.00
C-ITOH PROWRITER PARALLEL	480.00
C-ITOH PROWRITER SERIAL	590.00
EPSON MX-80 W/GRAFTRAX+	$CALL
EPSON MX-80 F/T W/GRAFTRAX+	$CALL
EPSON MX-100 W/GRAFTRAX+	$CALL
EPSON GRAFTRAX PLUS	60.00
COMREX-CR1 PARALLEL	839.00
COMREX-CR1 SERIAL	859.00
IDS PRISM 80 W/COLOR	1599.00
IDS MICROPRISM 480	$CALL
NEC 8023A	485.00
NEC SPINWRITER 3530 P. RO	1995.00
NEC SPINWRITER 7710 S. RO	2545.00
NEC SPINWRITER 7730 P. RO	2545.00
OKIDATA MICROLINE 82A	469.00
OKIDATA MICROLINE 83A	720.00
OKIDATA MICROLINE 84	1199.00
OKIGRAPH 82	49.00
OKIGRAPH 83	49.00

APPLE HARDWARE

SUPER CLOCK II	129.00
VERSA WRITER DIGITIZER	259.00
SOFTCARD PREMIUM SYSTEM	575.00
MICROSOFT Z-80 SOFTCARD	249.00
MICROSOFT RAMCARD	125.00
VIDEX 80x24 VIDEO CARD	260.00
VIDEX KEYBOARD ENHANCER II	129.00
M & R SUPERTERM 80x24 VIDEO BD.	315.00
M & R COOLING FAN	44.95
T/G JOYSTICK	44.95
T/G PADDLE	29.95
T/G SELECT-A-PORT	54.95
VERSA E-Z PORT	21.95
PROMETHEUS VERSACARD	180.00
MICROBUFFER II‡ 16K W/GRAPHICS	259.00
MICROBUFFER II‡ 32K W/GRAPHICS	299.00
SUPERFAN II	62.00
RANA CONTROLLER	104.00
RANA DRIVES	335.00
SNAPSHOT	119.00
QUENTIN APPLEMATE	275.00

IBM HARDWARE

SEATTLE 64K RAM+	370.00
QUADRAM QUADBOARD 64K	464.00
64K MEMORY UPGRADE	80.00

ALPHA BYTE IBM MEMORY EXPANSION BOARDS

256K W/ RS-232C	349.00
256K W/ RS-232C & SUPERCALC	529.00
512K W/ RS-232C	599.00
512K W/ RS-232C & SUPERCALC	749.00

MONITORS

U.S.I. AMBER 12"	179.00
NEC 12" GREEN MONITOR	174.00
NEC 12" COLOR MONITOR	399.00
SANYO 12" MONITOR (B & W)	198.00
SANYO 13" COLOR MONITOR	402.00
AMDEK COLOR I	365.00
AMDEK RGB COLOR II	774.00
AMDEK RGB INTERFACE	169.00
COMREX 12" GREEN MONITOR	115.00
BMC 12" GREEN	89.00

MOUNTAIN HARDWARE

CPS MULTIFUNCTION BOARD	154.00
ROMWRITER	149.00
A/D + D/A	299.00
RAMPLUS 32K	160.00

CALIF. COMPUTER SYSTEMS

APPLE BOARDS

7710A ASYNCHRONOUS S. INTERFACE	149.00
7712A SYNCHRONOUS S. INTERFACE	159.00
7424A CALENDAR CLOCK	99.00
7728A CENTRONICS INTERFACE	105.00

MODEMS

NOVATION CAT ACOUSTICS MODEM	135.00
NOVATION D-CAT DIRECT CONNECT	156.00
NOVATION AUTO-CAT AUTO ANS	219.00
NOVATION APPLE-CAT (300 Baud)	310.00
NOVATION APPLE-CAT (1200 Baud)	605.00
HAYES MICROMODEM II (APPLE)	289.00
HAYES 100 MODEM (S-100)	325.00
HAYES SMART MODEM (300 BAUD)	227.00
HAYES SMART MODEM (1200 BAUD)	540.00
HAYES CHRONOGRAPH	199.00
LEXICON LEX-11 MODEM	119.00
SIGNALMAN MODEM W/ RS-232C	85.00

TERMINALS

TELEVIDEO 920C	830.00
TELEVIDEO 950C	995.00
ADDS-VIEWPOINT	599.00
HAZELTINE ESPRIT	510.00
VISUAL-50 GREEN	690.00

TRS-80 HARDWARE

PERCOM DATA SEPARATOR	27.00
PERCOM DOUBLER II W/ DOS 3.4	159.00
TANDON 80 TRK DISK DRIVE W/ P.S.	345.00
TANDON 40 TRK DISK DRIVE W/ P.S.	289.00
LNW DOUBLER W/DOSPLUS 3.3	138.00
LNW 5/8 W/ DOSPLUS 3.4	171.00
MOD III DRIVE KIT	615.00

HARD DISK DRIVE SPECIAL

MEDIA DISTRIBUTORS

5¼" Winchester, cabinet, P.S. controller, assembled and tested. Attaches to your Z-80 CPU system in minutes. Runs on Northstar, Heath/Zenith, TRS-80 Mod II, Apple w/ CP/M®, CCS and others. Hardware must be Z-80 / CP/M® system. The included self installing software attaches to your CP/M® system. 6-month warranty. No effect on your present floppy disk system. Includes all cables and installation instructions.

10 MEGABYTES	2370.00
20 MEGABYTES	3180.00

BARE DRIVES

TANDON 5¼ INCH

100-1 SINGLE HEAD 40 TRK	195.00
100-2 DUAL HEAD 40 TRK	269.00

Save 33%

FRANKLIN ACE 1000.....1595.00

RANA DISK DRIVE.....449.00

RANA DRIVE CONT. CARD.....135.00

C.ITOH 8510 PRINTER.....795.00

MICROBUFFER 32K.....299.00

NEC 12" GREEN MONITOR.....200.00

VERBATIM DISKS.....45.00

LIBRARY CASE.....5.00

~~$3523~~

Now $2352

100-3 SINGLE HEAD 80 TRK	250.00
100-4 DUAL HEAD 80 TRK	369.00

TANDON THINLINE 8 INCH

848-1 SINGLE SIDE	379.00
848-2 DUAL SIDE	490.00

MICRO PRO

APPLE CP/M®

WORDSTAR*†	199.00
SUPERSORT*†	109.00
MAILMERGE*†	60.00
DATASTAR*†	162.00
SPELLSTAR*†	109.00
CALCSTAR*†	109.00

MICROSOFT

APPLE

BASIC COMPILER*	296.00
Z-80 SOFTCARD	249.00
RAMCARD	125.00
OLYMPIC DECATHLON	24.95
TASC APPLESOFT COMPILER	130.00

CP/M®

BASIC 80	249.00
BASIC COMPILER	299.00
FORTRAN 80	359.00

APPLE SOFTWARE

SCREENWRITER II	99.00
DICTIONARY	79.00
MAGIC WINDOW	79.00
MAGIC MAILER	59.00
DB MASTER	169.00
DB MASTER UTILITY PACK	69.00
PFS: GRAPH	89.95
PFS: (NEW) PERSONAL FILING SYSTEM	85.00
PFS: REPORT	79.00
Z-TERM PRO*	129.95
EASY WRITER-PRO	199.00
EASY MAILER-PRO	79.00
EXPEDITER II APPLESOFT COMPILER	73.95
LISA 2.5	59.95
TRANSCEND II	115.00
WORD HANDLER	165.00

CONTINENTAL SOFTWARE

THE HOME ACCOUNTANT	59.95
FIRST CLASS MAIL	55.00

VISICORP

DESKTOP PLAN II	189.00
VISIPLOT	158.00
VISITREND/VISIPLOT	229.00
VISIDEX	189.00
VISITERM	79.00
VISICALC	189.00
VISIFILES	189.00

CP/M® SOFTWARE

THE WORD PLUS	117.00
d BASE II	429.00
QUICKCODE	230.00
DUTIL	91.00
SUPER CALC	189.00
P & T CP/M® MOD 2 & 16 TRS-80	175.00
COMMX TERMINAL PROG	82.50
SOFTWARE DIMENSIONS-G/L,A/R,A/P,P/R	1799.00
SUPERFILE	170.00

We carry all CP/M® software in all popular disk formats. Call for availibility/price.

IBM SOFTWARE

VOLKSWRITER	145.00
WRITE ON	90.00
EASYWRITER II	247.00
HOME ACCOUNTANT+	159.00
VISICALC / 256K	189.00
QUICKCODE	230.00
SUPERCALC	189.00
d BASE II	429.00
SUPERFILE	170.00
WORDSTAR	235.00
MAILMERGE	79.00

Call for additional IBM software.

IBM GAMES

DEADLINE	35.00
ZORK I OR ZORK II	28.00

TRS-80 SOFTWARE

NEWDOS/80 2.0 MOD I,III	139.00
LAZY WRITER MOD I,II	165.00
PROSOFT NEWSCRIPT MOD I,III	109.00
OMNITERM SMART TERM MOD I,III	89.95
MICROSOFT BASIC COMP. FOR MOD I	165.00
LDOS 5.1 MOD I,III	119.00
DOSPLUS 3.4	89.00

APPLE & ATARI GAMES

BRODERBUND

APPLE PANIC	23.61
MIDNIGHT MAGIC	27.26
CHOPLIFTER	27.20

AUTOMATED SIMULATIONS

INVASION ORION	20.95
STAR WARRIOR	31.35
CRUSH,CRUMBLE AND CHOMP	24.95
TEMPLE OF APSHAI	31.35
HELLFIRE WARRIOR	31.35
RESCUE AT RIGEL	23.36

ON-LINE SYSTEMS

WIZARD AND PRINCESS	27.26
SOFT PORN ADVENTURE	23.36
THRESHOLD	31.16
JAW BREAKER	23.36
CROSSFIRE	24.95
ULYSSES & GOLDEN FLEECE	25.95

EDU-WARE

COMPU-READ	24.95
COMPU-MATH FRACTIONS	34.95
COMPU-MATH DECIMALS	34.95

MORE APPLE GAMES

GALAXY WAR	20.95
ALIEN TYPHOON	20.95
ARCADE MACHINE	32.95
TUES. MORNING QUARTERBACK	25.95
THE DRAGON'S EYE	20.95
COMPUTER QUARTERBACK	31.16
SEA FOX	24.00
THE SHATTERED ALLIANCE	49.95
POOL 1.5	27.26
ULTIMA	31.16
RASTER BLASTER	23.36
FLIGHT SIMULATOR	26.61
INTERNATIONAL GRAND PRIX	25.95
SARGON II	28.95
SPACE KADETT	28.00
SNACK ATTACK	23.36
THIEF	24.95
MARS CARS	23.00
KAMIKAZI	27.26
THE WARP FACTOR	31.16
COSMO MISSION	23.36
WIZARDRY	37.95
ZORK I	28.00
ZORK II	28.00
DEADLINE	35.00

SIRIUS SOFTWARE

SPACE EGGS	23.36
GORGON	31.16
SNEAKERS	23.36
PHANTOMS FIVE	22.00
BANDITS	25.00

EDU-WARE

PERCEPTION PKG	19.95
COMPU-MATH: ARITHMETIC	39.95
COMPU-SPELL (REQ. DATA DISK)	24.95
COMPU-SPELL DATA DISKS 4-8, ea	17.95
RENDEZVOUS	28.50

ON-LINE SYSTEMS

ULTIMA II	42.00
MISSILE DEFENSE	27.26
SABOTAGE	20.95
TIME ZONE	77.96
CRANSTON MANOR	25.95
CANNON BALL BLITZ	25.95

MUSE SOFTWARE

ROBOT WARS	32.95
THREE MILE ISLAND	31.61
A.B.M.	19.46

CALL OUR MODEM LINE FOR WEEKLY SPECIALS.

To order or for information call

In New York: (212) 509-1923

In Los Angeles: (213) 706-0333

In Dallas: (214) 744-4251

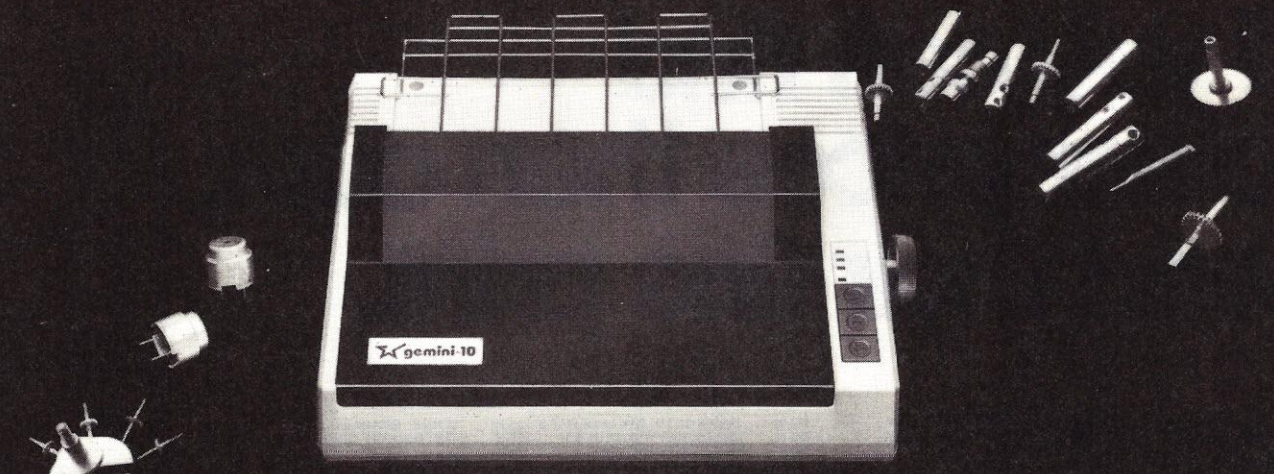
By Modem: (213) 883-8976

Alpha Byte COMPUTER PRODUCTS

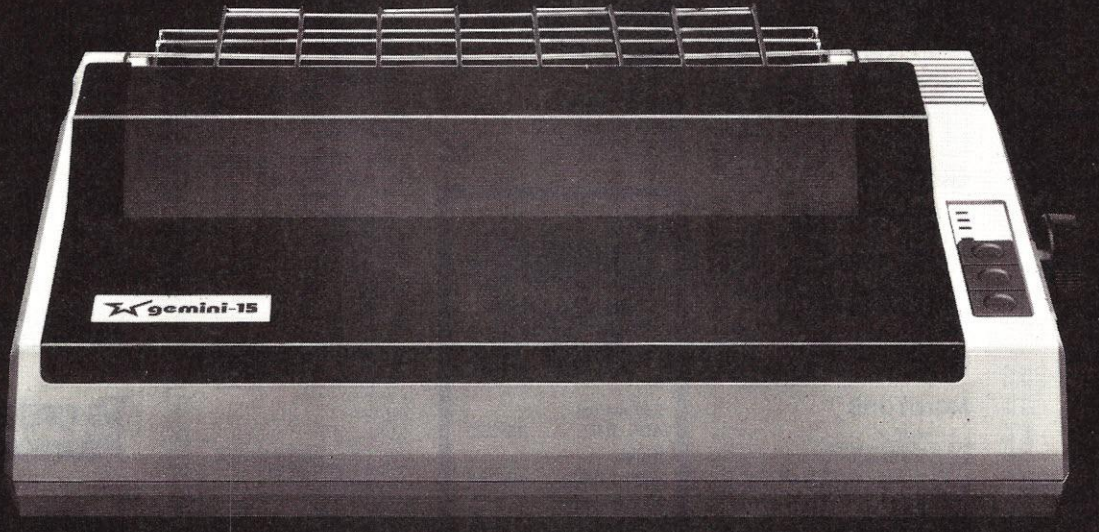
31245 LA BAYA DRIVE
WESTLAKE VILLAGE, CA 91362

CP/M is a reg. trademark of Digital Research. *Requires Z-80 Softcard. †Reg. trademark of Micro Pro International Corp. ‡Trademark of Practical Peripherals, Inc.

CIRCLE 105 ON READER SERVICE CARD



GEMINI–
FOR PRINTER VALUE THAT'S OUT OF THIS WORLD



Over thirty years of down-to-earth experience as a precision parts manufacturer has enabled Star to produce the Gemini series of dot matrix printers—a stellar combination of printer quality, flexibility, and reliability. And for a list price of nearly 25% less than the best selling competitor.

The Gemini 10 has a 10″ carriage and the Gemini 15 a 15½″ carriage. Plus, the Gemini 15 has the added capability of a bottom paper feed. In both models, Gemini quality means a print speed of 100 cps, high-resolution bit image and block graphics, and extra fast forms feed.

Gemini's flexibility is embodied in its diverse specialized printing capabilities such as super/sub script, underlining, backspacing, double strike mode and emphasized print mode. Another extraordinary standard feature is a 2.3K buffer. An additional 4 K is optional. That's twice the memory of leading, comparable printers. And Gemini is compatible with most software packages that support the leading printers.

Gemini reliability is more than just a promise. It's as concrete as a 180 day warranty (90 days for ribbon and print head), a mean time between failure rate of 5 million lines, a print head life of over 100 million characters, and a 100% duty cycle that allows the Gemini to print continuously. Plus, prompt, nationwide service is readily available.

So if you're looking for an incredibly high-quality, low-cost printer that's out of this world, look to the manufacturer with its feet on the ground—Star and the Gemini 10, Gemini 15 dot matrix printers.

star®
micronics·inc

MAKING A NAME FOR OURSELVES

1120 Empire Central Place, Suite 216, Dallas, TX 75247
For more information, please call Bob Hazzard, Vice President, at (214) 631-8560.

CIRCLE 271 ON READER SERVICE CARD

long it must take to create one of those drawings? The hi-res art in, for example, *Cranston Manor* does not challenge the artistic avant garde, but those pictures are hard to recreate, piece by piece, using the methods outlined in your Applesoft programming books. You could spend hours and days working on just one of them.

creative computing
SOFTWARE PROFILE

Name: The Graphics Magician

Type: Graphics program, programming aid

System: 48K Apple II or II+ with Applesoft, disk drive, paddles

Format: Disk

Language: Machine language and Applesoft

Summary: Excellent programming aid for pros and advanced amateurs.

Price: $59.95

Manufacturer: Penguin Software
830 Fourth Ave.
Geneva, IL 60134

There is something that explains all these mysteries, the Penguin *Graphics Magician,* by Chris Jochumson, David Lubar and Mark Pelczarski. This software package is the answer to the prayers of serious programmers who need good, hi-res graphics, in quantity, in a reasonable length of time. Not only that, the *Graphics Magician* lets you do the kinds of tricks with animated shapes that you see in the best games. The message I am trying to get across (the heck with being subtle about it) is that the *Graphics Magician* is miraculous and marvelous.

Using game paddles only, which I regard as fairly inefficient means of drawing under ordinary circumstances, I was able to create drawings using this software that would not look at all out of place in any of the current best-selling adventure games. Another few minutes of homework with the supplied documentation, and I was able to work the pictures into my own programs — as easy as a HIMEM, a POKE, and a CALL, to paraphrase Penguin's manual.

Picture/Object Editor

It is the Picture/Object Editor mode of the *Graphics Magician* which lets you do this part of the magic. To get there, you select, obviously, the Picture/Object Editor option from the main menu which appears at the beginning of the program when you boot the disk. The options which you are offered when the Picture/Object mode comes up are to catalog the disk, load an old picture for new work, or start a new picture.

In the new picture mode you see a blank white screen with a flashing cross hair cursor. You are in the line mode, which means that when you press the button in paddle 1, you will establish the starting point of a new line.

With a little practice it all comes together quickly. Using the button on paddle 0, you can draw a line from your starting point to the present location of your cursor. If you want to start a new, unconnected line, you just press button 1 and move the cursor to the desired spot.

This kind of flexibility, so simple and so logical, allows you to put lots of images on the screen, fast. Soon you will be ready for fill-in color. Here's where the real fun begins.

You have a palette of 100 colors from which to choose. In a picture I drew of a castle gate and drawbridge, for example, I used two shades of brown, two of blue, two of green, and four of grey. Hues are mixed by alternating bands of color and darkened by the addition of dots and lines. The result is that you have a very wide range of color selection. The difficulty encountered in drawing curved lines is more than made up for by the colors which can be used.

If you make a mistake, correction is simple. You can either type D to delete the last command given or go into the Edit mode to delete the mistake instruction and, if you like, insert new ones. This makes it easy to get your proportions right and to change colors if necessary.

When you have a finished picture, the program will store it on disk. The programs are easily retrievable, using up about two disk sectors of your 496 to write the appropriate commands in Applesoft or machine language to bring the picture up.

Animation

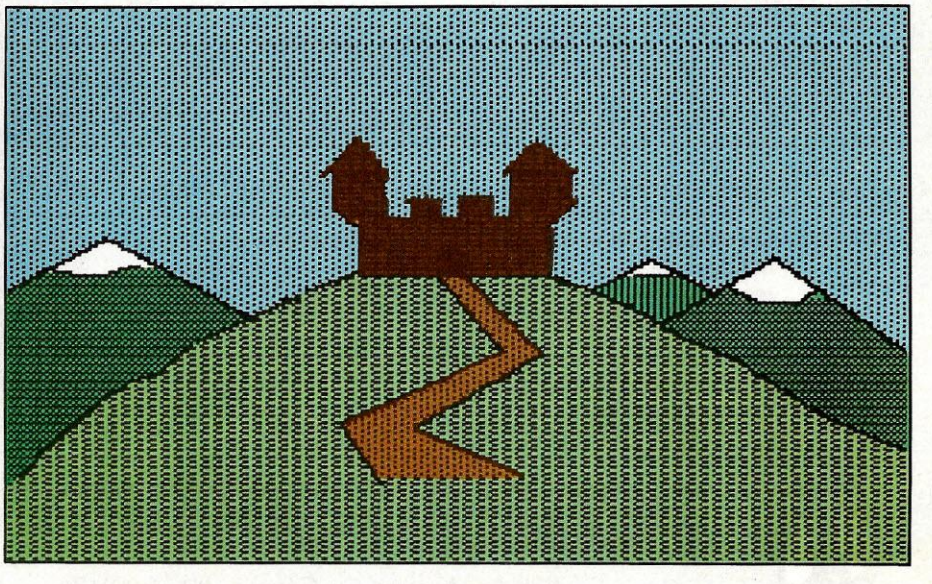
You would normally assume at this point that I have described about all there is to this program, but now we come to a new and even more magical segment of the package, the Animation System. In this mode you create color shapes (available colors are blue, white, orange, violet and green) that you can later animate. The job of animation is done literally bit by bit, using single key commands to maneuver a miniscule cursor and to imprint a color dot as desired. Going slowly and patiently you can create rather realistic airplanes, figures, flying saucers, etc.

You will find, when you choose this mode, that there are seven sets of cursors. Over each cursor is an orange bar. You can turn off a bar by typing a number (the documentation tells you which bar corresponds to which number) and turn it back on again with the same number. As you maneuver the cursor and imprint the dots, you get identical pictures for each cursor with the bar "on". Nothing drawn where the bar is "off."

If you like, using this feature, you could have your figure (of a man, for example) appear to move his arms and legs as he walks by moving the limbs a little in each of the seven shapes you draw. On the other hand, if you wanted to show a car smoothly gliding along, you would leave all the shapes "on" at the same time, repeating the shape seven times.

In animation the "car" would move, but there would be no internal movement. Were you to leave one or two of the pictures off for the entire shape creation process, the animated shape would see to disappear briefly.

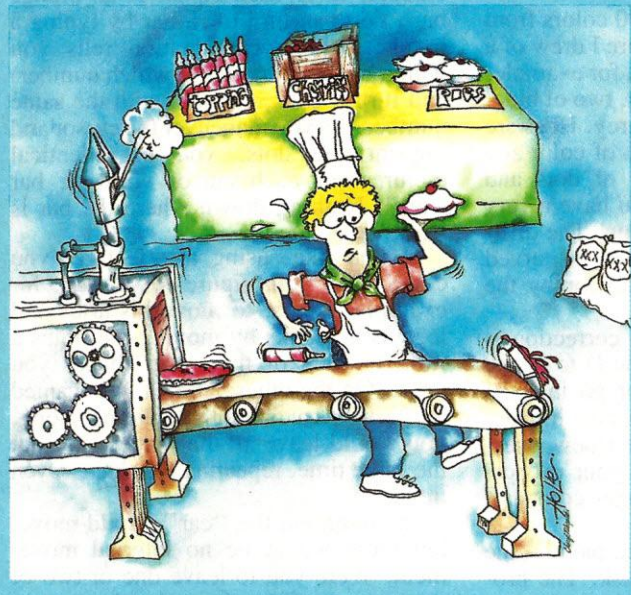
Having created a shape and animated it, the program now enables you to create



SPY'S DEMISE

Arcade Action by Alan Zeldin

Somewhere on each floor of the Soviet diplomatic mission in Pyongyang are the nine parts of an encoded message. Your future is assured if you can just find those pieces and put them together, and then solve the puzzle. But to do so you must avoid the embassy guards who make frequent rounds at unscheduled intervals. They don't ask questions first, either.



PIE-MAN

by Eagle Berns and Michael Kosaka

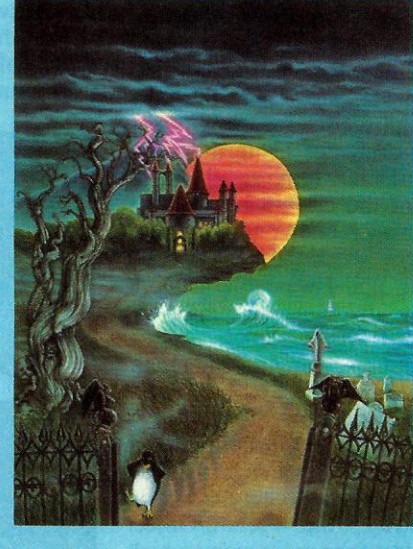
You got a late start looking for that summer job, and all you could find was a baker apprentice position at the Automated Bakery Company. Simple enough, since the pies are made by machine . . . all you have to do is add topping and put the pies away when they come out on the conveyor belt. Shouldn't be too difficult of a summer, you think to yourself . . .

TRANSYLVANIA

A High Resolution Graphic Adventure

Crafted by Antonio Antiochia

Transport yourself to the dark forests of Transylvania, where mystery lurks behind every towering tree, and venture to rescue a damsel in distress. Transylvania uses over one hundred colors and the finest graphics ever seen in a high resolution adventure to present a true challenge and hours of enjoyment to all adventurers.



Above games now available for the Apple computer. Arcade games work with keyboard, joystick, or Atari joystick. Graphics for all above created with the aid of The Graphics Magician.

penguin software

the graphics people

830 4th Avenue Geneva, Illinois 60134 (312) 232-1984

Apple is a trademark of Apple Computer, Inc. Atari is a trademark of Warner Communications, Inc.

CIRCLE 232 ON READER SERVICE CARD

Apple Graphics, continued...

a path for it. Again, by using single key commands, you can send your shape in any of eight directions on the screen. The path is saved separately from the shape.

It is in the Animation Editor that you put the shapes together with the paths to create complete routines which you can add to your game programs or graphic demonstrations. At any time you can go back and edit any part of the routine you have created. You can take the path you have used and ally it with different shapes. You can take a shape from another file and mate it with the path for an entirely new routine. These possibilities give you a good idea of how flexible this software really is.

It should be noted that the documentation, while giving you a basic rundown on the program commands you need to integrate your pictures and animation into your programming, is written with experienced programmers in mind. Beginners will find the documentation to be rough going at first, but with patience they will soon be able to put the Animation System and the Picture/Object Editor go through their paces.

Super Shape Editor

Another aspect of this software package is the Super Shape Editor. This time you work with Applesoft shapes, which are defined either as pictures on screen or in tables. Once you figure out how the system works, the drawing goes quickly.

You can draw in seven colors. your line may be from one to 255 points in length. It can be lengthened or shortened at any time. Using the paddle button, you determine the tilt of the line and give the command when it is to be drawn. Using lines one or two points long, and after practice at setting the angles, you can make curing lines or sharp, geometric shapes as you prefer.

A nice thought is that the shapes take up about half as much memory space as an Applesoft shape table would need. This means extra space for text and pictures in your programs.

The capabilities in the Penguin *Graphics Magician* are like those of the Apple II. What they can do is limited only by the creativity of the user. Creative programming pros will find that the *Graphics Magician* allows them to do more, do it quicker and make the end result more attractive and exciting. That's all anyone could ask of a graphics magician. □

Figure Notes: All Penguin graphics are by the author. They were drawn in the On-Line style of graphics as a homage to their games. All *GPS* graphics are freehand creations of the author.

Why pay more for TRS-80 Model 16 Model II Model III Printers Color Computer

EPSON C. ITOH APPLE FRANKLIN OKIDATA ATARI

Our prices are so low we aren't allowed to print them!

We'll meet or beat any price from an authorized dealer!

We have cables to interface our printers with IBM, and Osborne computers.

We have the lowest prices, massive inventory, and can deliver.

VISA MasterCard AMERICAN EXPRESS

Microline 82A $409 OFFER EXPIRES 1/83

Send for FREE 40-page catalog including equipment reviews, prices, specs, and illustrations on over 600 computers and accessories.

CALL TOLL FREE: 800-526-5313

COMPUTER DISCOUNT OF AMERICA, INC.
15 Marshall Hill Road, West Milford Mall
West Milford, New Jersey 07480-219
In New Jersey Call 201-728-8080

Computer Discount of America

CIRCLE 138 ON READER SERVICE CARD

Happy Hands

Offers Discounts on All

TRS-80™ COMPUTERS

We Have What You Are Looking For

Free Shipping Within United States

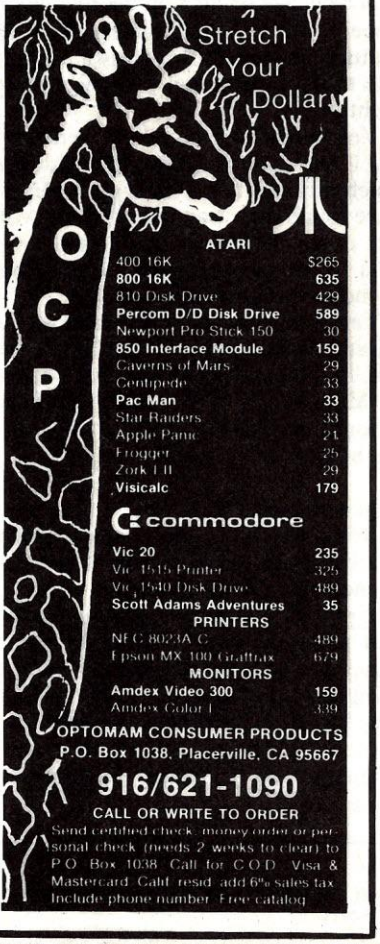
- *26-4002 Mod II 64K $2650.00*
- *26-1066 Mod III 48K 1912.00*
- *26-3004 16K Color 260.00*
- *26-3002 16K Color Ext-Basic 340.00*
- *26-3003 32K Color Ext-Basic 500.00*
- ***No Tax On Out of State Shipments***

For Additional Prices and Shipping Information
Call Toll Free
1-800-545-9019
N.M. Residents Call 257-7865

or write

HAPPY HANDS
P.O. DRAWER I
RUIDOSO, NEW MEXICO
88345

CIRCLE 180 ON READER SERVICE CARD



ATARI

400 16K	$265
800 16K	635
810 Disk Drive	429
Percom D/D Disk Drive	589
Newport Pro Stick 150	30
850 Interface Module	159
Caverns of Mars	29
Centipede	33
Pac Man	33
Star Raiders	33
Apple Panic	21
Frogger	25
Zork I II	29
Visicalc	179

commodore

Vic 20	235
Vic 1515 Printer	325
Vic 1540 Disk Drive	489
Scott Adams Adventures	35

PRINTERS

NEC 8023A-C	489
Epson MX 100 Graftrax	679

MONITORS

Amdex Video 300	159
Amdex Color I	339

OPTOMAM CONSUMER PRODUCTS
P.O. Box 1038, Placerville, CA 95667

916/621-1090

CALL OR WRITE TO ORDER

Send certified check, money order or personal check (needs 2 weeks to clear) to P.O. Box 1038. Call for C.O.D. Visa & Mastercard. Calif. resid. add 6% sales tax. Include phone number. Free catalog.

CIRCLE 223 ON READER SERVICE CARD

A Comparative Review

Ada for CP/M

creative computing software evaluation

The following review of two Ada subset compilers is the third in a three-part series on the Ada language.

Geoff Gilpin

You have to feel some compassion for anyone who would try to implement the Ada language on an 8-bit microcomputer. Face it, Ada is *huge*! Stuffing all of Ada's features into a Z80 processor would be like trying to pour Lake Michigan into a bathtub.

Yet reasonably complete versions of PL/1 and Cobol, languages which are much more at home on big mainframes, have found their way into the 8-bit world. But could the power and complexity of Ada be crammed into my little desktop friend? I was (and am) skeptical.

Tentative answers to the Ada-for-CP/M question have been provided by Supersoft Inc. of Champaign, IL and RR Software of Madison, WI; the other implementations that I have seen advertised run on the heftier 16-bit machines.

Supersoft Ada

Being a cautious pioneer, Supersoft is quick to point out that theirs is "presently an incomplete implementation of the Ada programming language." But they promise that their compiler "will be further developed to enable implementation of the complete Ada language." When? "By the time that Ada has been recognized by the microcomputer community as a viable language for software development." Okay.

Geoff Gilpin, 1018 N. Leminwah St., Appleton, WI 54911.

Supersoft Ada is supplied on disk and is available in most CP/M formats. The disk contains ADA.COM, the Ada compiler; CODE 8080, a program which takes Ada pseudo-code and generates a COM file; and Kapse, the Kernal Ada Program Support Environment, a collection of I/O and other useful run-time routines that loosely conform to specifications for the STANDARD and INPUT OUTPUT packages provided by the Department of Defense.

creative computing
SOFTWARE PROFILE

Name: Supersoft Ada
Type: Ada subset compiler
System: 48K CP/M
Format: Disk
Language: Machine code
Summary: Very limited subset of Ada
Price: $250
Manufacturer:
Supersoft Inc.
P.O. Box 1628
Champaign, IL 61820

In addition to the three system files, Supersoft provides several sample programs including two games, Startrek and Mazewars. As an Apple II owner running Ada on the Microsoft Z80 Softcard, I should mention that some of the demo programs require an 80-column screen and would have to be re-written for the Apple. Even though I use a Videx 80-column board, some of the programs used cursor-positioning commands that did funny things on my screen. Be warned.

Two documents are supplied with the disk—Supersoft's Ada manual and the DoD's own Military Standard reference, bound in khaki and written in an appropriately faceless militarese. In contrast to the DoD manual, which is thick and exhaustive, the Supersoft document is quite terse—a mere 29 pages. Mostly, it describes the differences between standard Ada and Supersoft's version. The longest section lists the parts of the language that Supersoft has left unimplemented.

The Compiler

Operation of the compiler is straightforward. Once an Ada source program has been created with ED or another CP/M text editor it is compiled by typing "Ada" followed by the filename. If you have included the PRINT or LIST pragma in the source text (*pragma* is the Ada term for a compiler directive) you will get a program listing on either the screen or printer, as requested.

Syntax errors are noted by an arrow pointing to the spot where the compiler found a problem. In my experience, Supersoft's error messages aren't always to the point. For example, as the compiler was parsing a program containing the following statements:

```
array(0):='X'

while array(0) /= 'Q' loop
```

How about a nice vacation on the beaches of France – for just $39.95?

At SSI, we think that our latest software for the Atari,® TRS-80® and Apple® — BATTLE FOR NORMANDY™ — is more than a great strategy game. We think of it as a great vacation package. After all, we are whisking you off to the northern coast of France for 25 days of fun and excitement (June 6 to 30, 1944) — all for just $39.95!

Of course, we're not promising peace and quiet. There is a war going on, you know....World War II!

We'll be taking you to the beaches of Normandy in style. Not on a mere jumbo 747 or an ocean liner, but an LCI (that's Landing Craft Infantry). Let's see the Joneses top that!

Like any good traveler, you need to plan ahead. What's the weather going to be like out there? Rough and stormy? Calm and gorgeous? It's hard to say, so you'd better be prepared for all kinds.

How about supplies? Well, we're a little tight on luggage space, so you'll have to juggle among the things you really need: fuel, general, and combat supplies.

How about some friendly sea bombardment to let the natives know you're coming? After all, you don't want trouble once you hit the beaches. The natives are a bit hostile at first, and a little naval artillery fire really helps to loosen them up.

And our service? Have we got good service — and plenty of it! Whole divisions and regiments of infantry, paratroopers, tank units, and commandoes are at your every beck and call. We do have to apologize for their different leadership and combat ratings. It's so hard to get good, consistent help these days.

You want sightseeing? You've got sightseeing! Nice historical towns like St. Lo, Cherbourg, and Caen — which you just have to take in (or take over, as the case may be.)

We know there's a lot that goes into preparing for a vacation, and we don't want you to worry about the details one bit.

SSI is one of the most advanced companies around because we're totally computerized. Our great computer program takes care of all the dirty work so all you do is enjoy. After all, you're on this trip for the fun and games, not work. And if you have a hard time finding friends to play with, who needs friends? You can play solitaire against the computer any time.

For complete details see the travel agent at your nearest game or computer store today!

SSI

STRATEGIC SIMULATIONS INC

As part of our demanding standards of excellence, we use MAXELL floppy discs.

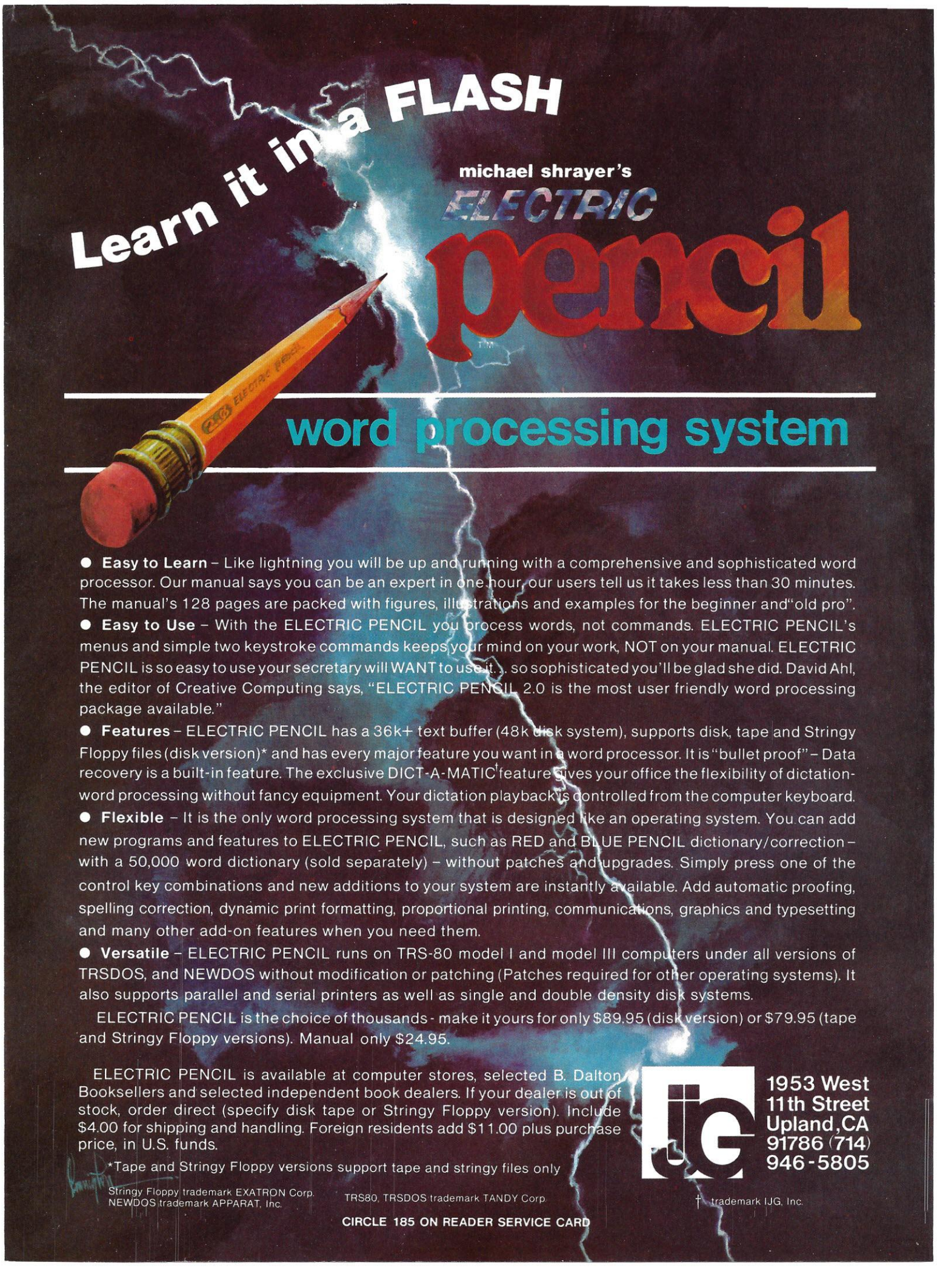
If there are no convenient stores near you, VISA and M/C holders can order direct by calling **800-227-1617, ext. 335 (toll free)**. In California, call 800-772-3545, ext. 335. To order by mail, send your check to: Strategic Simulations Inc, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. (California residents, add 6.5% sales tax.)

Available in 32K cassette or 40K disc for the Atari® 400/800, 16K cassette for the TRS-80® Level II, Models I & III, and 48K disc for the Apple® II with Applesoft ROM card. Please specify which version when ordering.

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

CIRCLE 272 ON READER SERVICE CARD

Apple is a registered trademark of Apple Computer Inc. Atari is a registered trademark of Atari Inc. TRS-80 is a registered trademark of the Tandy Corporation.



● **Easy to Learn** – Like lightning you will be up and running with a comprehensive and sophisticated word processor. Our manual says you can be an expert in one hour, our users tell us it takes less than 30 minutes. The manual's 128 pages are packed with figures, illustrations and examples for the beginner and "old pro".

● **Easy to Use** – With the ELECTRIC PENCIL you process words, not commands. ELECTRIC PENCIL's menus and simple two keystroke commands keeps your mind on your work, NOT on your manual. ELECTRIC PENCIL is so easy to use your secretary will WANT to use it... so sophisticated you'll be glad she did. David Ahl, the editor of Creative Computing says, "ELECTRIC PENCIL 2.0 is the most user friendly word processing package available."

● **Features** – ELECTRIC PENCIL has a 36k+ text buffer (48k disk system), supports disk, tape and Stringy Floppy files (disk version)* and has every major feature you want in a word processor. It is "bullet proof" – Data recovery is a built-in feature. The exclusive DICT-A-MATIC† feature gives your office the flexibility of dictation-word processing without fancy equipment. Your dictation playback is controlled from the computer keyboard.

● **Flexible** – It is the only word processing system that is designed like an operating system. You can add new programs and features to ELECTRIC PENCIL, such as RED and BLUE PENCIL dictionary/correction – with a 50,000 word dictionary (sold separately) – without patches and upgrades. Simply press one of the control key combinations and new additions to your system are instantly available. Add automatic proofing, spelling correction, dynamic print formatting, proportional printing, communications, graphics and typesetting and many other add-on features when you need them.

● **Versatile** – ELECTRIC PENCIL runs on TRS-80 model I and model III computers under all versions of TRSDOS, and NEWDOS without modification or patching (Patches required for other operating systems). It also supports parallel and serial printers as well as single and double density disk systems.

ELECTRIC PENCIL is the choice of thousands - make it yours for only $89.95 (disk version) or $79.95 (tape and Stringy Floppy versions). Manual only $24.95.

ELECTRIC PENCIL is available at computer stores, selected B. Dalton Booksellers and selected independent book dealers. If your dealer is out of stock, order direct (specify disk tape or Stringy Floppy version). Include $4.00 for shipping and handling. Foreign residents add $11.00 plus purchase price, in U.S. funds.

*Tape and Stringy Floppy versions support tape and stringy files only

IJG

1953 West
11th Street
Upland, CA
91786 (714)
946-5805

Stringy Floppy trademark EXATRON Corp.
NEWDOS trademark APPARAT, Inc.

TRS80, TRSDOS trademark TANDY Corp.

† trademark IJG, Inc.

CIRCLE 185 ON READER SERVICE CARD

an error was indicated at the loop statement, and a message saying "assignment operator expected" was printed when the problem was obviously a missing semicolon on the previous line.

My long association with Pascal has convinced me that a compiler should at least be able to catch missing semicolons. Other misleading error messages are produced when the user tries to redefine Ada's reserved words—another thing a compiler should be able to sniff out.

There are a couple of other minor quirks. Although the advertising promises "printer output," the documentation doesn't mention how it's done, and so far none of the several methods that I have tried has sent a single character to my Qume. Also, the "list" pragma (for sending program listings to the CP/M LST device) doesn't work (I have tried it on two different systems).

Many Omissions

I recognize that these are the kind of small flaws that could be found in the first release of any major software package. I do have one serious complaint, however, which will appear after a more thorough tour of Supersoft Ada.

There are more data types and structures in Ada than in any other language that I have seen. There are seven predefined numeric types; scads of data structures including such exotica as array slices and variant records; and an infinite number of custom-built types and structures.

From this potpourri, Supersoft has implemented just six data types and a single data structure: arrays. No records. No user-defined types. Just the usual integers, Booleans, and characters.

A similar situation exists in one of Ada's most crucial areas: program organization. Modularity is the hallmark of Ada, and it is supported through features such as subprograms, separate compilation, packages (collections of Ada resources something like "units" in UCSD Pascal), and program libraries. The intent is to divvy up Ada programs and data in little boxes which can be accessed only through the correct protocol. This should encourage portability and make it easier to build large systems from small standardized building blocks.

How does this philosophy of divide and conquer fare in Supersoft Ada? Consider this:

Ada subprograms (specifically procedures, although functions are also supported) can accept three types of parameters—*in, out*, and *in out*. The last are used in subprograms which accept a value, modify it, and return it to the calling environment. Incredibly, Supersoft Ada supports only *in* parameters. That's right—any variable which is to be modified by a subprogram must be declared globally, just as in Basic. And this is the most sophisticated kind of program structure available in the Supersoft compiler. So much for modularity.

There are other strange omissions—like the lack of an *exit* statement to terminate a basic Ada *loop*—that would make serious programming very difficult.

In fact, only one of the unique features of Ada seems to have been implemented—subprogram overloading (the creation of two or more subprograms that share the same name).

After all that, I believe that the nature of my "serious complaint" should be pretty obvious. It is, ahem, this: *They only implemented a tenth of the language!*

To be fair, I realize that the Ada language itself is still in a period of transition. Some of the 16-bit versions haven't yet implemented the more esoteric features. Even the DoD's language definition hasn't quite solidified yet.

But does this justify a price of $250 for what is essentially a "mini-Pascal"?

Supersoft is apparently sticking to its intention of providing the full language. But they have many man hours ahead of them, and if the cost of the updates (which would comprise about 90% of the language) is proportional to the first release, I don't know anybody who will be able to afford them.

Janus

Fortunately, there is an alternative—Janus, the Ada compiler offered by RR Software. RR doesn't call their product "Ada" because they have no intention of bringing it up to the full DoD standard. That's good.

The large-scale, exotic features of Ada—such as inter-disk communication and generic program units—create so much overhead in an 8-bit machine that their implementation is, in my opinion, just plain unrealistic. RR has wisely avoided such esoterica and produced a subset of Ada that is both useful and workable.

Even with this economical approach, Janus is no lightweight. Consider:

- The Supersoft compiler takes up 16K; Janus occupies 130K (nearly two full disks on my Apple system).
- Supersoft's manual is 29 pages long with a page and a half describing error messages; RR's is 128 pages, ten of which are devoted to error messages.
- Janus supports ten programs; Supersoft implemented two (one of which doesn't work).
- Janus supports based numbers, attributes, enumeration types, subtypes, packages, and a host of other Ada features not found in the Supersoft implementation. In fact, there really is no comparison. Coming to Janus after using the Supersoft product is like being given *carte blanche* at the Ritz after a week of eating nothing but crumbs and tap water.

creative computing
SOFTWARE PROFILE

Name: Janus
Type: Ada subset compiler
System: 56K CP/M
Format: Disk
Language: Machine code
Summary: A useful and powerful language
Price: $300
Manufacturer:
RR Software
P.O. Box 1512
Madison, WI 53701

The thoroughness and careful attention to detail that went into Janus are evident from the first compilation. The user is presented with an array of compiler options that do everything from suppressing debugging code to informing about differences between Janus and standard Ada. During the four passes of the Janus compiler, information is provided on available memory, code and data addresses, table size, and anything else that might save debugging time. In fact, Janus gives you more information than the IBM Optimizing Compiler for PL/1.

Error Handling

I was particularly impressed with the kindness displayed by Janus in error handling. Syntax errors are spotted early in the compilation process, a thoughtful feature for impatient programmers using a four-pass compiler. The much trickier run-time errors generate a useful "walkback" that greatly simplifies debugging. Consider how Janus would handle the following, fatally flawed program.

```
package body TEST is
   function FUNC (X, Y: integer)
                  return integer is
     begin
     return X/Y;
     end FUNC;

   procedure PROC (X, Y: integer) is
   Z: integer;

     begin
     Z := FUNC (X, Y);
     end PROC;

begin -- TEST
PROC (0, 0);
end TEST;
```

The run-time error occurs in the fifth line (counting blanks) of the program where X is divided by zero. Most compilers would just give a message such as "Divide by zero at line 5" and leave it to

the programmer to track the problem down. Janus gives you this:

```
*** Divide by zero detected

On line number 5 in TEST.FUNC

Called from line number 12 in TEST.PROC

Called from line number 16 in TEST
```

I imagine that this would be a godsend for people working on a big, convoluted program.

The Janus language itself represents a hefty subset of Ada—perhaps as much as 60% of the DoD specs with more to come in updates. Janus really *looks* like Ada; not like a warmed-over Pascal.

All the Ada operators are here (including relational operators for arrays, records, and enumeration values), along with most of the data types including derived (*new*) types, the *access* (pointer) type, and the non-Ada byte type. (The *task* and *limited private* types, for multiprogramming and data hiding respectively, will remain unimplemented.)

Good News For Systems Programmers

There are several extensions to Ada that make Janus particularly attractive to the systems programmer. (This isn't surprising—RR uses Janus for all their in-house programming.)

There is an ASM statement that allows insertion of in-line assembly code or other binary data. For instance, the following Janus procedure will re-boot CP/M.

```
procedure RE_BOOT is
  JMP:   constant := 16#C3#;
                     -- 8080 branch opcode
                     -- expressed in Ada
                     -- "based number"
                     -- notation.
  ENTRY: constant := 16#0000#;
                     -- CP/M entry point.

begin
  Asm JMP, ENTRY;
end RE_BOOT;
```

There is also a "conditional compilation" feature that causes certain portions of code (specifically, those statements preceded by an @ marker) to be ignored by the compiler unless the user says otherwise in the command line, or toggles the CONDCOMP pragma within the source program. This feature has already saved me some debugging time and, again, I imagine that it would be invaluable in the development of a large system.

Business programmers will be pleased to know that strings in Janus are handled differently than in standard Ada. To the great relief of all, Janus strings have a dynamic length attribute. In other words, the statements

```
S: string(1..10) := "rendezvous";
...

S := "Fred";

put (S);
```

will print "Fred" instead of "Fredezvous." Thank you, RR.

In addition to the language itself, several program libraries are included on the distribution disk(s). (The whole Janus package takes up four Apple disks or one single-density 8" disk.) There is a library of string-handling routines (STRING.LIB) to help with the everyday tasks of searching, replacing, and extracting strings from other strings.

A HEAP.LIB provides several low level functions such as garbage collection (reclaiming unused memory), individual bit testing and setting, and a MEMAVAIL procedure to keep you informed of how much space is left.

The third library, IO.LIB, is RR Software's solution to the somewhat controversial problem of Ada input/output. As defined by the DoD, I/O functions aren't really a part of the language itself; instead, a group of *generic* I/O routines are *instantiated* by each programmer whenever they are needed (somewhat like using a single stencil for drawing multiple copies of a design).

As far as I know, however, none of the current versions of Ada (even the 16-bit implementations) offer generics. To complicate the problem, the DoD recently redefined the procedures for handling random-access files. It seems that we can expect a year or two of daffy anarchy before the dust settles in this area of Ada.

IO.LIB contains the Janus routines for creating, reading, writing, deleting, and otherwise manipulating disk files. Other peripheral devices—the CP/M CON: and LST: devices, for instance—are also recognized. The procedures in IO.LIB, although not "standard," look enough like those in the Ada Reference Manual to be fairly portable. The current version of Janus (release 1.4.3) does not support random access I/O, although the people at RR assure me that that is one of their priorities.

One beautiful thing about text I/O in Janus is that *get* and *put* have been extended to work with Booleans and enumeration values. (Since this feature depends on instantiation of generic packages in standard Ada we won't be seeing it in other versions of the language for some time.) To illustrate, the statements

```
type PHILOSOPHY is (ROMANTICISM,
                    IDEALISM,
                    NARROW_MINDEDNESS);
BELIEF_SYSTEM:  PHILOSOPHY;
TRUTHFUL:       Boolean := true;
    ...

BELIEF_SYSTEM := NARROW_MINDEDNESS;
put (BELIEF_SYSTEM);
put (" is ");
put (not TRUTHFUL);
```

would print

```
NARROW_MINDEDNESS is FALSE
```

This is a really good feature (sadly missing in Pascal) which I intend to use frequently.

Omissions

There are a couple of omissions in Janus. Real numbers and multi-dimensional arrays are not supported as of this writing, although both should be available by the time you read this. The only important feature of Ada found in the Supersoft compiler and not in Janus is overloading of procedures and functions. The people at RR inform me that overloading is being contemplated for a future release.

So, for now at least, the jury is in—Janus encompasses at least five times as much of Ada as Supersoft, including many of the more exotic features of the language. Janus is a really useful tool, especially for systems programmers and people who wish to get a head start on learning Ada (you will learn little about Ada from the Supersoft product).

The Janus package provides nearly four times as much software (including the compiler, an 8080 assembler, a disassembler, the support libraries, and fully-documented run-time source code) as Supersoft for about $50 more.

I will leave to you the decision of which product to buy. □

Ada Errata

The author has found a few bugs in the previous two installments of "The Countess and the Computer Language."

In Part One (November), Page 192, top right column, the test "if MEEKNESS in ADA_QUALITIES" would produce a type error when compiled. To make this test legal, ADA_QUALITIES would have to be declared as a subtype of another enumeration type that had MEEKNESS as a possible value.

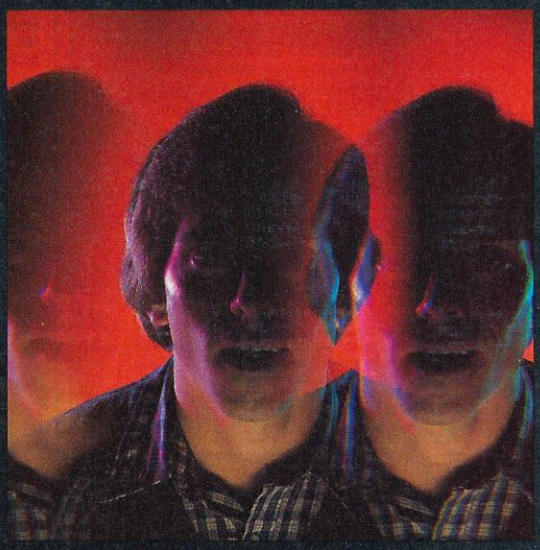
At the bottom of the same column, the declaration "PERIMETER: SIDES * LENGTH_UNIT;" is also illegal. The problem is that a constraint parameter (SIDES in this example) can be used only in declarations of arrays. The correct line is "PERIMETER: array (SIDES) of integer;".

In Part Two (December), Page 219, column 1, the line "procedure SQUARESUM (X: in integer;" should read "procedure SQUARESUM(X:in out integer;". The "out" specification allows the next assignment statement to work properly.

Near the end of that installment, the statement "use FREDS_IO_PACKAGE, SALLYS_IO_PACKAGE;" should be removed. This statement would cause confusion for subsequent "put" statements.

INTRODUCING

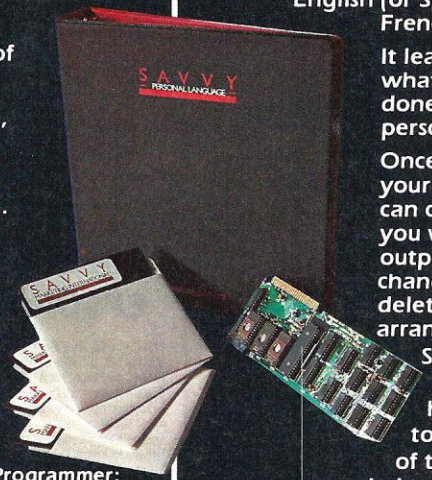
SAVVY™



. . . the PERSONAL LANGUAGE™ system that mirrors your commands using your own words!

What SAVVY is —

- SAVVY is a miraculous new information handling system.
- SAVVY is an automatic database management system.
- SAVVY is a new level of machine intelligence.
- SAVVY, part hardware, part software, is the beginning of truly "Personal Computing".
- SAVVY comes with: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Mailing List, Document Writer and Inventory Control.



Trademark: SAVVY, Robot Programmer: Excalibur Technologies Corporation.

Personal Language: SAVVY Marketing International.

What SAVVY does —

Through SAVVY, you and your computer talk to each other in your own natural, conversational English (or Spanish, or French, etc.).

It learns from you what you want done in your own personal language.

Once SAVVY learns your language it can create any file you wish. Input, output, additions, changes and deletions are arranged for you.

SAVVY's "Robot Programmer" has been trained to write 100% of the programs needed to manage your database information.

SAVVY runs CP/M™ and Apple DOS.

What YOU discover —

You'll discover that SAVVY recognizes your personal words, even if misspelled, or even if you use a phrase never used before!

SAVVY continues to grow through use to become better and better at understanding your commands.

Eventually, you will see SAVVY as a mirror to your own way of thinking and working. It is a re-definition of "user-friendly".

SAVVY, it's the first system that truly means "personal computing".

SAVVY is like no other system on earth.

SAVVY cost $950.

Seeing is believing. SAVVY is on display at selected computer retail locations. Call for the name of your nearest dealer.

CP/M is a trademark of Digital Research Corp.

Apple is a Trademark of Apple Computer Inc.

CIRCLE 305 ON READER SERVICE CARD

100 South Ellsworth Street, 9th Floor, San Mateo, CA 94401 (415) 340-0335

SAVVY

MARKETING INTERNATIONAL

The Choice of

Computer Exchange — The Supply Center for the IBM-PC

SOFTWARE for the IBM-PC

BUSINESS

		LIST PRICE	OUR PRICE
ASHTON-TATE, dBase II, CP/M-86		$ 700	$459
DENVER SOFTWARE, Easy (Executive Accounting System)		$ 725	$545
HOWARDSOFT, Real Estate Analyzer		$ 250	$189
INFORMATION UNLIMITED, Easywriter II (a WPS)		$ 350	$259
IUS	Easyspeller (88K Words)	$ 175	$129
	Easyfiler (a DBMS)	$ 400	$299
	Easy Planner	$ 250	$189
INNOVATIVE SOFTWARE, T.I.M. III (a DBMS)		$ 495	$369
★ **INSOFT**, Data Design (a powerful easy to use DBMS) NEW!		$ 225	$169
INNOVATIVE, Spell Guard		$ 295	$220
ISA, Spell Guard		$ 295	$195
ISM, MatheMagic		$ 90	$ 69
LEXISOFT, Spellbinder (a versatile WPS in CP/M-86)		$ 495	$249
MICRO LAB, The Tax Manager		$ 250	$189
★ **MICROPRO**, WordStar® plus free WordStar Training Manual		$ 495	$365
	MailMerge™	$ 250	$185
	SpellStar™	$ 250	$185
	Special! All Three Above, WordPac	$ 895	$695
	WordStar Training Manual	—	$ 25
NORTH AMERICAN BUS. SYSTEM, The Answer		$ 250	$169
PEACHTREE, Inventory Series 40		$ 600	$399
	Peach Pak 40 (GL, AR & AP)	$ 595	$395
PERFECT SOFTWARE, Perfect Writer™		$ 389	$239
	Perfect Speller™	$ 189	$119
	Perfect Filer™	$ 289	$179
SELECT INFO., Select (a WPS)		$ 595	$375
SORCIM, SuperCalc		$ 295	$199
	SuperWriter, call on availability	$ 395	$269
	Spell Guard, call on availability		Call
SUPERSOFT, Disk Doctor (CP/M-86)		$ 100	$ 75
	Diagnostics II (CP/M-86)	$ 125	$ 95
	Scratch Pad (CP/M-86 and MS-DOS)	$ 295	$225
VISICORP, VisiCalc®/256K		$ 250	$179
	VisiDex	$ 250	$199
	VisiTrend/Plot	$ 300	$219
	VisiFile	$ 300	$239
	Desktop Plan	$ 300	$239

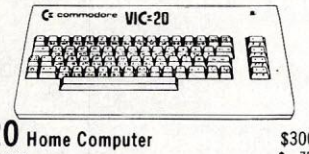
UTILITY

	LIST PRICE	OUR PRICE
NAGY SYSTEM, Copy/PC, Backup Copier and Utilities	$ 35	$ 29
NORELL DATA, ™ System-Backup, Bit Copier	$ 50	$ 39
NORTON, Norton Utilities, 14 powerful programs, 3 disks	$ 80	$ 65

HOME & EDUCATIONAL

	LIST PRICE	OUR PRICE
ACORN, Lost Colony	$ 30	$ 24
AUTOMATED SIMULATIONS, Temple of Apshai	$ 40	$ 29
Upper Reaches Apshai	$ 20	$ 15
Jabbertalky	$ 30	$ 22
Curse of Ra	$ 20	$ 15
AVALON HILL, Galaxy	$ 25	$ 20
Midway Campaign	$ 21	$ 17
Computer Stocks and Bonds	$ 25	$ 20
Voyager	$ 25	$ 20
Draw Poker	$ 21	$ 17
BRODERBUND, Apple Panic	$ 30	$ 22
CONTINENTAL, The Home Accountant Plus	$ 150	$112
DATAMOST, Write-On	$ 130	$110
Pig Pen	$ 30	$ 22
Space Strike	$ 30	$ 22
CONTINENTAL, The Home Accountant Plus	$ 150	$112
DAVIDSON, The Speed Reader	$ 75	$ 55
INFOCOM, Deadline	$ 50	$ 39
Zork I	$ 40	$ 29
Zork II	$ 40	$ 29
ON-LINE SYSTEMS, Frogger	$ 35	$ 26
Ulysses & The Golden Fleece	$ 35	$ 25
PBL CORP, Personal Invester	$ 145	$ 99
SENTIENT, Cyborg, (Call on availability)	$ 35	—
SIRIUS, Conquest	$ 30	$ 23
Call to Arms	$ 30	$ 23
SPINNAKER, Snooker Troops, #1 or #2	$ 45	$ 35
Story Machine	$ 35	$ 25
Face Maker	$ 35	$ 25
STRATEGIC, The Warp Factor	$ 40	$ 30
VERSA COMPUTING, Graphics Hardcopy System	$ 25	$ 19

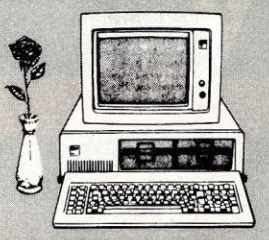
commodore



VIC 20 Home Computer — $300 / $199

Datasette VIC 1530	$ 75	$ 59
Disk Drive VIC 1540	$ 600	$369
Super Expander VID 1211A 3K with lots of extras	$ 70	$ 56
8K Memory Expander Cartridge	$ 60	$ 48
16K Memory Expander Cartridge, Microtek	$ 159	$115

Wide VIC 20 Software and Peripheral line in stock. Call



HARDWARE for the IBM-PC

		LIST PRICE	OUR PRICE
AST RESEARCH, Combo Plus, 64K with one option.	NEW!	$ 495	$379
Combo Plus, 256K with one option.	NEW!	$1095	$729
Options: Async. Comm. Port., Para. Printer Port., Clock/Calender Add $50 for second option and $35 for third.			
Parity Memory Card, 64K		$ 395	$279
256K		$ 995	$659
Note: All of above cards are memory upgradeable.			
BYAD INC., DS1, Z80B for CP/M-80		$ 660	$570
DS2, above with serial port.		$ 760	$660
CORVUS, Hard Disk System, See Corvus Section This Page.			
CURTIS, PC Pedestal,™ for Display on PC		$ 80	$ 65
3 Foot Cable for IBM Mono Display		$ 50	$ 39
DAVONG, DS1-501 Hard Disk, 5 Meg		$1995	$1595
★ **MICROSOFT**, 64K RAM Card w/Parity, RAM Drive & Utility		$ 350	$259
128K RAM Card w/Parity, RAM Drive & Utility		$ 525	$395
256K RAM Card w/Parity, RAM Drive & Utility		$ 875	$659
64K RAM Chips™		$ 175	$129

QUADRAM CORPORATION

Quadboard, 64K, expandable to 256K, 4 function board		$ 595	$445
Quadboard, 128K, expandable to 256K, 4 function board		$ 775	$575
Quadboard, 192K, expandable to 256K, 4 function board		$ 895	$645
★ Quadboard, 256K, four function board		$ 995	$685
Memory Board, 512K, with Serial Port, #6512		$1295	$995
Memory Upgrade Kit, 64K (9 chips), #B260		$ 150	$ 95
Microfazer, Snap-on, 8K, Par/Par, Epson, #ME8		$ 159	$129
Microfazer, Snap-on, 64K, Par/Par, Epson, #ME64		$ 299	$219
Microfazer, same as #ME8 except with copy, #MP8		$ 169	$139
Microfazer, same as #MP8 except 128K		$ 445	$345
Power Supply for Microfazer, (9V, 25A) #PS1		$ 20	$ 15
TG PRODUCTS, Joystick		$ 65	$ 49

Tandon Disk Drives

TM100-1 Single Sided 160K		$ 280	$229
TM100-2 Double Sided 320K		$ 350	$279
VISTA COMPUTER, 576K Maxicard		$1395	$1195

XEDEX **Baby Blue**

64K plus CP/M-80 operation		$ 600	$495

PRINTERS, Impact

EPSON, See Epson section below.			
IDS, Prism 132, Color w/Graphics		$1995	$1549
Prism 80, Color, w/Graphics		$1795	$1450
★ Pager Tiger 440, w/Graphics & 2K	Limited Special!	$1295	$495
Microprism 480, near letter quality		$ 799	$699
NEC, 8023 Printer F/T		$ 695	$525
OKIDATA, Microline 82A, 120 Cps. 80 Col. Para & Serial		$ 649	$495
PAPER, Tractor Feed, Variety in stock, call for price.			

CORVUS SYSTEMS

	LIST PRICE	OUR PRICE
★ **6 Meg Hard Disk**	$2995	$2495
11 Meg Hard Disk	$4795	$3995
20 Meg Hard Disk	$5795	$4795
IBM PC Interface (IBM DOS), Manual & Cable 5'	$ 300	$239
Mirror built-in for easy backup	$ 790	$649
Apple Interface, Manual & Cable 5'	$ 300	$239

Other Interfaces, Omni-Net, Constellation, Mirror. All in Stock.

HEWLETT PACKARD

	LIST PRICE	OUR PRICE
H/P 7470A Graphics Plotter	$1550	$1195
H/P 41C Calculator	$ 250	$210
H/P 41CV Calculator with 2.2K Memory	$ 325	$275
H/P 41 Card Reader	$ 215	$179
H/P 41 Optical Wand	$ 125	$105
Wide variety of software and accessories available.		Call

8" CP/M-80 BUSINESS & SYSTEM SOFTWARE

		LIST PRICE	OUR PRICE
ADVENTURE, Adventure's #1 to #12 inclusive, 8"		$ 129	$ 95
ASHTON-TATE, dBase II, 8"		$ 700	$459
COMSHARE TARGET, Target PlannerCalc		$ 50	$ 39
	Masterplanner	$ 325	$225
	PlannerCalc Applications Pkg.	$ 50	$ 40
	PlannerCalc Combo Pkg.	$ 90	$ 65
INFOCOM, Deadline, 8"		$ 60	$ 45
Zork I, 8"		$ 50	$ 39
Zork II, 8"		$ 50	$ 39
INNOVATIVE, Spellguard, 8"		$ 295	$199
ISM, MatheMagic		$ 100	$ 75
MICROCRAFT, Legal Billing & Time Keeping — Verdict		$ 750	$395
Prof. Billing & Time Keeping — Billkeeper		$ 750	$395
★ **MICROPRO**, WordStar® plus free WordStar Training Manual		$ 495	$365
MailMerge™		$ 250	$185
SpellStar™		$ 250	$185
Special! All Three Above, WordPac		$ 895	$695
WordStar™ Training Manual		—	$ 25
DataStar™		$ 295	$199
SuperSort™		$ 250	$175
CalcStar™		$ 145	$ 99
Special! All Three Above, DataPac		$ 695	$449
MICROSOFT, Multiplan		$ 275	$199
Fortran-80, 8"		$ 500	$325
BASIC Compiler, 8"		$ 395	$295
COBOL-80, 8"		$ 750	$545
BASIC-80, 8"		$ 350	$275
muLisp/muStar-80		$ 200	$145
M-Sort-80		$ 195	$145
Edit-80		$ 120	$ 80
Macro-80		$ 200	$145
OASIS, The Word Plus (a WPS)		$ 150	Call
PEACHTREE, GL, AR & AP, Series 40, all three		$ 595	$395
Inventory, Series 40		$ 600	$399
Peach Text, Spell & Mail, all three		$ 595	$395
Call on Series 8, each		$ 750	$499
PERFECT SOFTWARE, Perfect Writer™		$ 389	$239
Perfect Speller™		$ 189	$119
Perfect Speller™		$ 289	$179
QUALITY, GBS with 3 generators, (a DBMS)		$ 700	$525
← **SELECT INFO.**, Select (a WPS)		$ 595	$375
SORCIM, SuperCalc		$ 295	$199
Super Writer, call on availability		$ 395	$269
Spell Guard, call on availability		$ 295	Call
SUPERSOFT, Disk Doctor (CP/M-80)		$ 100	$ 75
Diagnostics II (CP/M-80)		$ 125	$ 95
Scratch Pad (CP/M-80)		$ 295	$225

MONITORS

		LIST PRICE	OUR PRICE
NEC, 12" Green		$ 249	$159
12" Color, Composite		$ 450	$349
SANYO, 9" B&W		$ 190	$149
★ 9" Green	Special truckload sale	$ 200	$119
12" B&W		$ 250	$199
12" Green		$ 260	$199
13" Color, Composite		$ 470	$349
13" Color RGB		$ 995	$795
ZENITH, 12" Green		$ 150	$119
AMDEK, 12" Green #300		$ 200	$159
13" Color I, Composite		$ 449	$359
13" Color IIA, RGB, Hi Res, (Ap II, III & IBM-PC)		$ 999	$799
13" Color III, RGB, Commercial, (Ap II, III)		$ 569	$469
DVM, Color II or III to Apple II Interface		$ 199	$175
Note: Color II and III come with cable for IBM-PC.			

DISKETTES

★Control Data Corporation 12 for 10 Special. Limited Time!

CDC, 120 each, 5¼ with ring, SS, SD (Apple, IBM, etc.)		$ 450	$195
12 each, 5¼, with ring, SS, SD (Apple, IBM, etc.)		$ 40	$ 22
12 each, 5¼ with ring, SS, DD (H/P, IBM 320K, etc.)		$ 51	$ 28
12 each 8", SS, SD		$ 51	$ 28
10 each, 5¼ with ring, DS, DD (IBM)		$ 50	$ 39
IBM, 10 each, 5¼, SS, SD (Apple, IBM, etc.)		$ 60	$ 45
10 each. 5¼, SS, DD (H/P, IBM 320K, etc.)		$ 65	$ 49
VERBATIM, 10 each 5¼, with ring, SS, SD or SS, DD		$ 50	$ 28
MAXELL, 10 each 5¼, SS, SD		$ 55	$ 35
DYSAN, 10 each 5¼, SS, SD		$ 55	$ 39
10 each 5, DS, DD		$ 65	$ 49

EPSON PRINTERS & ACCESSORIES

MX80 F/T III, with Graftrax+	$ 745	$525
MX100 F/T III, with Graftrax+	$ 995	$695
IBM-PC to Epson Cable	$ 60	$ 45
Apple Interface and Cable for MX80 or MX100	$ 120	$ 95
Grappler+ by Orange Micro, specify your computer	$ 165	$119
Apple Graphics Dump	$ 15	$ 9
Atari to Epson Cable	$ 40	$ 30
TRS-80 to Epson Cable	$ 40	$ 30
Other cables, interfaces, ribbons, heads and paper in stock		Call

NATIONAL ORDER DESK TOLL FREE
(800) 547-1289
OTHER ORDERS: 772-3256

Hot Line For Information On Your Order
(503) 772-3803

MasterCard VISA

ORDERING INFORMATION AND TERMS: All mail to P.O. Box 1380, Jacksonville, OR 97530. All items usually in stock. We ship immediately on Cashiers Checks, Money Orders, Fortune 1000 Checks and Government Checks. Personal, Certified or Company Checks allow 20 days to clear. No C.O.D. Add 3% for VISA or MC. Include telephone number. Add 3% for shipping, insurance and handling (S, I&H) with $5 minimum. UPS ground is standard so add 3% more for UPS BLue with $10 minimum. Add 12% total for S, I&H for US Postal, APO or FPO with $15 minimum. For Hawaii, Alaska and Canada, UPS is in some areas only; all others are Postal so call, write, or specify PO. Foreign orders except Canada for S, I&H add 18% or $25 minimum except for moniters add 30% or $50 minimum. Prices subject to change and typo errors, so call to verify. All goods are new, include factory warranty and are guaranteed to work. Due to our low prices, all sales are final. Call before returning goods for repair or replacement. Orders received with insufficent S, I&H charges will be returned. ORDER DESK HOURS 8 to 6 PST, M-F and 10 to 4 Sat. 1 PM here is 4 PM in NY.

OUR REFERENCES: We have been a computer dealer since 1978 and in mail order since 1980. Banks: First Interstate Bank, (503) 776-5620 and Jefferson State Bank, (503) 773-5333. We belong to the Chamber of Commerce, (503) 772-6293, or call Dun & Bradstreet if you are a subscriber.

Computer Exchange is a division of O'Tech Group, Inc.

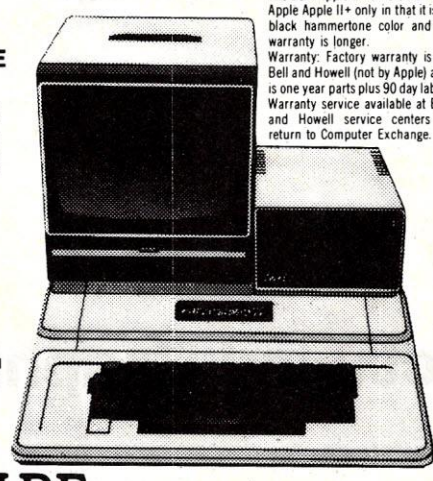
Portland, OR. Cash & Carry Outlet, 11507-D SW Pacific Hwy., Terrace Shopping Center, Tigard, OR. Over-the-counter sales only. On 99W between Rte. 217 and Interstate 5. Call 245-1020.

Professionals

Manufactured Exclusively for Bell & Howell by apple computer

	LIST PRICE	OUR PRICE	SAVE
B&H Apple II+			
64K (48K + ALS 16K)	$1725	$1195	$530
DISK II w/3.3 Cont.	$645	$520	$125
DISK II Only	$525	$450	$75

OR: SAVE OVER $350 on a pair of drives.
Buy a pair of Micro-Sci A2 Drives.
See opposite page.



The B&H Apple II+ differs from th Apple Apple II+ only in that it is in black hammertone color and its warranty is longer.
Warranty: Factory warranty is by Bell and Howell (not by Apple) and is one year parts plus 90 day labor. Warranty service available at Bell and Howell service centers or return to Computer Exchange.

SPECIAL

B & H APPLE II+
64K STARTER SYSTEM $1,795
SAVE $ 765

- 48K B&H Apple II+
- ALS 16K RAM Card
- Disk II with 3.3 DOS & Controller
- Sanyo 9" Green Monitor

μ-SCI MICRO-SCI FOR THE APPLE II/II+, III DIRECT SUBSTITUTES for APPLE DRIVES

Micro-Sci A2 drives and/or controllers are direct plug compatible subsbtutes for Apple drives and controllers.

	LIST PRICE	OUR PRICE
● **For Apple II**		
A2, 5¼", 143K Disk Drive	$ 479	$369
Controller Card for A2 Drive	$ 100	$ 79
A40, 5¼", 160K Disk Drive	$ 449	$359
A70, 5¼", 286K Disk Drive	$ 599	$479
Controller for A40 or A70	$ 100	$ 79
Filer, Disk Utility Software NEW!	$ 20	$ 15
● **For Apple III** A3, 5¼, 143K Drive	$ 449	$359
A73, 5¼, 286K Drive	$ 649	$529
A143, 5¼, 572K Drive	$ 799	$669

apple® II/II+ supply center

HARDWARE
for Apple II/II+

	LIST PRICE	OUR PRICE
RAM CARDS:		
Microsoft, 16K RAM Card	$ 195	$149
★ **ALS**, 16K ADDRam	$ 149	$ 59
★ **DCP**, 16K RAM Card SUPER SPECIAL	$ 179	$ 49
Saturn Systems, 32K	$ 249	$169
64K	$ 425	$319
128K	$ 599	$459
Axlon, 320K RAM Disk system	$1395	$995
80 COLUMN VIDEO CARDS:		
ALS, Smarterm	$ 345	$249
Videx, Videoterm	$ 345	$249
See more **ALS** and **Videx** below.		
Vista, Vision 80	$ 395	$249
M&R, Sup R term	$ 375	$319
MISCELLANEOUS:		
ALS, Smarterm 80 Col. Card Special	$ 345	$199
Z Card (Z-80) W/CPM Special	$ 269	$199
★ 16K ADDRam Special	$ 149	$ 59
★ Synergizer Pack Special	$ 749	$450
Synergizer Pack includes above 3, + CP/M book. Note: Above is a limited time offer.		
Apple Computer,		
Silentype II Printer	$ 395	$335
Graphics Tablet	$ 795	$675
Joystick II	$ 50	$ 39
Game Paddle	$ 30	$ 19
Numeric Keypad	$ 150	$119
Axlon, 320K RAM Disk System	$1395	$995
CCS, Serial Interface 7710A	$ 150	$129
Other CCS Cards in stock	Call	Call
Dan Paymar, Lower Case Chips	$ 50	$ 39
Hayes, Micromodem II	$ 379	$275
Smartmodem	$ 279	$229
Kensington, System Saver	$ 90	$ 69
★ **Keyboard Company**,		
Joystick II	$ 50	$ 39
Game Paddle	$ 30	$ 23
Numeric Keypad	$ 150	$119
M&R, RF Modulator	$ 30	$ 25
Sup R fan	$ 50	$ 39
★ **Microsoft**, Z80 Softcard	$ 399	$269
16K RAM Card	$ 195	$149
Softcard Premium Pack	$ 775	$579
Mountain,		
CPS Multifunction Card	$ 239	$209
★ Clock/Calendar	$ 280	$245
Novation, Applecat Modem	$ 389	$299
Orange Micro, Grappler	$ 165	$119
★ **Practical Peripherals**,		
MBS 8K Serial (Epson)	$ 159	$129
MBP 16K Para (Epson)	$ 159	$129
★ Microbuffer II 16K,(specify)	$ 259	$209
Microbuffer II 32K, (specify)	$ 299	$229
RH Electronics, Super Fan II	$ 75	$ 59
SSM, AIO-II, Serial/Para. Interface	$ 225	$169
TG Products: Game Paddles	$ 40	$ 29
Joystick	$ 60	$ 45
Select-A-Port	$ 60	$ 45
★ **Videx**, Videoterm 80 col.	$ 345	$249
Soft Video Switch	$ 35	$ 25
Enhancer II	$ 149	$ 99
Enhancer (Rev. 6)	$ 129	$ 99
Function Strip	$ 79	$ 59
Applewriter II preboot disk	$ 20	$ 15
Visicalc to 64K preboot disk	$ 50	$ 39
Visicalc to 176K preboot disk	$ 90	$ 69
Full Videx Line. Call, up to 35% off.		

SOFTWARE
on disk for Apple II/II+

OUR BEST SELLERS — CALL ON OTHERS

BUSINESS

	LIST PRICE	OUR PRICE
Apple Computer, Inc.		
The Controller (Accounting)	$ 625	$499
Apple Writer II	$ 150	$119
Apple Pascal	$ 250	$199
Apple Fortran	$ 200	$159
DOS Tool Kit	$ 75	$ 59
DOS 3.3 Upgrade Kit	$ 75	$ 59
Apple Pilot	$ 150	$119
DJ Portfolio Evaluator	$ 50	$ 45
How to!	$ 50	$ 39
Microcourier	$ 250	$199
Micro Telegram	$ 250	$199
Time Manager	$ 150	$119
Apple Logo	$ 175	$139
Applied Soft Tech., Versa Form	$ 389	$265
Artsci, Magic Window II	$ 100	$ 69
Ashion-tate, dBase II (CP/M)	$ 700	$439
Continental, GL, AR, AP or PR, ea.	$ 250	$169
1st Class Mail	$ 75	$ 49
Home Accountant	$ 75	$ 49
Hayden, Pie Writer (Specify brd.)	$ 170	$ 99
High Tech., Job Control Sys.	$ 750	$350
★ Info Master	$ 189	$119
Howard Soft,		
Creative Financing	$ 195	$129
Real Estate Analyzer II	$ 195	$129
Tax Preparer	$ 150	$ 99
Info. Unlim., Easywriter (PRO)	$ 150	$ 99
★ **Innovative**, Spellguard (CP/M)	$ 295	$150
Lexisoft, Spellbinder (a WPS)	$ 495	$269
★ **Micro Craft**, (CP/M)		
Professional Billkeeper	$ 750	$395
Legal Billing & Timekeeping	$ 750	$395
Micro Lab, Invoice Factory	$ 200	$129
Tax Manager	$ 150	$ 99
Micro Pro, (all CP/M)		
★ WordStar® + Training Manual	$ 495	$365
MailMerge™	$ 250	$185
SpellStar™	$ 250	$185
SPECIAL! All 3 above	$ 895	$695
Data Star™	$ 295	$199
CalcStar™	$ 145	$ 99
SuperSort™	$ 250	$175
SPECIAL! All 3 above	$ 690	$449
Muse, Super Text II	$ 150	$113
Super Text 40/80	$ 175	$129
Super Text 40/56/70 New!	$ 125	$ 95
Form Letter	$ 100	$ 75
On-Line, ScreenWriter II	$ 130	$ 89
General Manager	$ 150	$115
Oasis System, The Word	$ 150	$119
Osborne/C.P. Soft., (Disk and Book)		
★ Some Common Basic Programs. 75 Business, Statistics and Math programs for the Apple II Practical Basic Programs.	$ 100	$ 49
★ 40 more very valuable programs beyond "Some Com. Basic Prog"	$ 100	$ 49
Peachtree, (CP/M), specify Videoterm or 40 column.		
3 Pak 40, (GL, AR & AR)	$ 595	$395
Inventory, Series 40	$ 400	$275
Peachpay, Series 40	$ 400	$275
3 Pak 9, (Text, Spell & Mail)	$ 595	$395
Perfect, Perfect Writer	$ 389	$239
Perfect Speller	$ 189	$119
Perfect Filer	$ 289	$179
Quality, GBS w/3 gen. (a DBMS)	$ 650	$475
Sensible, Sensible Speller	$ 125	$ 85
Silcon Valley, Word Handler	$ 250	$139
Sof/Sys, Executive Secretary	$ 250	$169
Executive Speller	$ 75	$ 55
Solidus/Softech		
★ Stockfile	$ 600	$350
Stockseller	$ 700	$450
Software Publishing,		
PFS II	$ 125	$ 85
Report	$ 95	$ 65
Graph	$ 125	$ 85
Sorcim, SuperCalc, (CP/M)	$ 295	$219
Southeastern,		
Data Capture 4.0, specify brd.	$ 90	$ 69
Stoneware, DB Master	$ 229	$155
DB Utility I or II	$ 99	$ 69
Systems Plus.		
Acctg. Plus, General Ledger	$ 425	$295
Acctg. Plus, GL, AP and A/R	$ 995	$595
Acctg. Plus, above + Inventory	$1395	$775
VisiCorp/Personal Software,		
Visicalc 3.3	$ 250	$179
VisiDex Special!	$ 250	$175
VisiFile	$ 250	$179
Desktop Plan II	$ 250	$179
Desktop Plan III	$ 300	$219
Visiplot	$ 200	$149
VisiSchedule New!	$ 300	$219
VisiTrend & VisiPlot Special!	$ 300	$179
VisiTerm	$ 100	$ 79

UTILITY & DEVELOPMENT

Beagle, Utility City	$ 30	$ 22
DOS Boss	$ 24	$ 18
Central Point Software:		
Filer, DOS Utility	$ 25	$ 18
★ Copy II Plus (bit copier)	$ 40	$ 35
Comp. Appl., Nibbles Away II	$ 70	$ 59
Epson, Graphics Dump	$ 15	$ 9
Insoft,		
GraFORTH by Paul Lutus	$ 75	$ 59
ALD System II by Paul Lutus	$ 75	$ 59
TransFORTH II by Paul Lutus	$ 125	$ 99
Microsoft,		
A.L.D.S.	$ 125	$ 75
BASIC Compiler	$ 395	$299
Cobol 80	$ 750	$559
Fortran 80	$ 195	$149
Olympic Decathlon	$ 30	$ 24
TASC Compiler	$ 175	$159
★ **Omega**, Locksmith (bit copier)	$ 100	$ 75
On-Line, Expediter II, Compiler	$ 100	$ 69
LISA 2.5	$ 80	$ 60
Penguin, Comp. Graphics Sys. New!	$ 70	$ 53
Phoenix, Zoom Grafix	$ 40	$ 29
Quality, Bag of Tricks New!	$ 40	$ 29
Southwestern, ASCH Express	$ 80	$ 59
Sensible, Back It Up, (bit coper)	$ 60	$ 49

OVERSTOCK SPECIALS
FOR APPLE II/II+

ALS 16K AddRAM Card	$ 149	$ 59
ALS ZCard, Z80 CP/M Card	$ 269	$199
ALS Smarterm 80 Col. Card	$ 345	$249
ALS Synergizer Pack, 3 above	$ 749	$450
ALS Synergizer + Supercalc	$ 749	$490
ALS Synergizer + Condor Jr.	$ 749	$490
ALS Synerg. + Supercalac + Condor	$ 749	$560
DCP 16K RAM Card Special	$ 179	$ 59
Saturn Systems, 32K RAM Card	$ 249	$169
Videx, Videoterm, 80 column card	$ 345	$249

HOME & EDUCATION

Broderbund,		
Apple Panic	$ 30	$ 21
Arcade Machine (call first)	$ 45	$ 40
Choplifter New!	$ 35	$ 26
Many others		Call
Budgeco, Raster Blaster	$ 29	$ 22
Continental, Home Accountant	$ 75	$ 49
Edu-Ware, Several in stock	Call	Call
Hayden, Sargon II (Chess)	$ 35	$ 29
Infocom, Deadline	$ 50	$ 38
Insoft, Electric Duet by Lutus	$ 30	$ 25
Zargs New!	$ 35	$ 27
Spider Raid New!	$ 30	$ 24
Lightning, Mastertype	$ 40	$ 29
Microsoft, Olympic Decathlon	$ 30	$ 24
Typing Tutor II	$ 25	$ 19
Muse, Robot War	$ 40	$ 29
Castle Wolfenstein	$ 30	$ 23
On-Line,		
Ultima II	$ 55	$ 40
Threshold	$ 40	$ 30
Softporn (X Rated)	$ 30	$ 22
Cannonball Blitz. New!	$ 35	$ 26
Quality, Bag of Tricks	$ 40	$ 30
Sirius, Gorgon	$ 40	$ 29
Sir-Tec, Wizardry	$ 50	$ 39
Knight of Diamonds. New!	$ 35	$ 26
Sub Logic, Flight Simulator	$ 34	$ 25
Pinball	$ 30	$ 23
Strategic, Southern Command	$ 60	$ 30

OTHER BRANDS IN STOCK. CALL.

ATARI

800 Computer 16K	$ 899	$665
800 Computer 48K	$1099	$777
810 Disk Drive	$ 600	$499
850 Interface	$ 220	$169
410 Recorder	$ 100	$ 79
32K RAM, Microtek	$ 100	$ 85
32K RAM	$ 200	$109

Call for other software and accesories.

LIMITED SPECIAL

NEC

8001 32K Computer	$ 995	$699
286K Total, Dual Drive PC8031	$ 995	$699
32K addon and I/O Unit PC8012	$ 649	$485

Call for other software and accesories.

THE WORLD'S LARGEST COMPUTER MAIL ORDER FIRM

Computer Exchange™

AD #945

A Division of O'TECH Group Inc.

ALL MAIL: P.O. Box 1380, Jacksonville, OR 97530

WAREHOUSE AND OFFICES. BY APPOINTMENT AT 6791 UPPER APPLEGATE ROAD.

★ Means a BEST buy.

CIRCLE 140 ON READER SERVICE CARD

creative computing evaluation software

A Structured Graphics Language

Ed Jackson

The best thing I can say about *Ceemac* is that I never bought a piece of software for so little that was worth so much. It is not easy to find. You just have to run across an ad. Brooke Boering, the author, is operating on a shoestring at this time. His ads are one inch classifieds.

How then, you might ask, did I happen to buy *Ceemac*? Well, Mr. Boering had a marketing idea that was a combination of sheer genius and audacity. He made a demo disk of the kind of graphics that *Ceemac* is capable of creating, supplied it to computer stores, and asked them to give copies free to their customers. That was my introduction to *Ceemac*.

I was enchanted with that demo and would have paid the $40 he asks for *Ceemac*, for the demonstration disk alone. The demo disk holds 35 *scores*, as the author calls his programs. At the touch of a key, the display changes from one dazzling display to another. On disk you find a series of programs which describe the various scores; the company, Vagabondo Enterprises; and Arthur, the language with which these text programs were created.

For your $40, you get a diskette and a manual—not a tutorial, but a manual. It suggests that you take one of the many demonstrations and experiment with it—learn by doing.

Ceemac is not a utility to aid you in the creation of hi-res graphics using the standard Apple commands. It is a stand alone language complete with pre-defined variables, macros, line editor, commands, and error messages. It is a structured language. You do not enter program line numbers. (Nor does *Ceemac*. There *are* no line numbers.)

It points out syntax errors by placing the cursor at the beginning of the blunder, and beeping *once*. If the editor cannot detect the error until execution, it immediately lists the program, gives an error message, and places a prompt on the offending line.

Ed Jackson, 4100 Fairlane, Fort Worth, TX 76119.

creative computing

SOFTWARE PROFILE

Name: Ceemac
Type: Graphics art
System: 48K Apple, DOS 3.3
Format: Disk
Summary: Incredible, and a bargain.
Price: $40.
Manufacturer:
Vagabondo Enterprises
1300 E. Algonquin - 38
Schaumburg, IL 60195

Using The Program

What you create is not always what you set out to create, but it is always stunning in its beauty and speed of execution. You can make a paddle control the speed, or make it control a variable. You can use the buttons to start fresh, to change the color of your drawings, or to change the background color. These changes occur very rapidly.

Editing possibilities include upward and downward scrolling, list from the top, delete, replace, insert, or edit a line. All of these commands are started with only one key.

The only control characters are control-a for moving from edit to execution, and control-c to move to DOS mode.

If you are familiar with Applesoft, some of the commands will seem familiar. These include GOTO, GOSUB, FOR, and AGAIN. If you forget, type NEXT, the editor forgives you and immediately replaces it with AGAIN. Commands that are different from Applesoft and Integer are nupool, rndcol, nxtcol, spline, forcel, adot, and setasp. Among the things you can do with these commands are: set the symmetry of the pattern, setup a ratio between x and y coordinates, set xscale and yscale and rotation, and draw shapes. *Ceemac* does not have a shape generator. There are, however, instructions for creating shape tables.

There are also many commands unique to *Ceemac*. For instance, "sky," gives you a sky, complete with number of stars you want, in any color you want, instant-

ly. And "abox" draws boxes, rectangular or square.

You can create sounds with *Ceemac* or have music from your cassette control the graphics. You also have a "trace" function, and the command that I think is the cleverest of all, is. If you type x1 = x1 % 5, x1 will increment itself to the edge of the screen and then *decrement* itself back down. And vice versa.

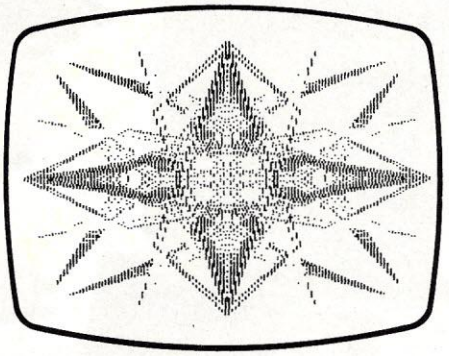
Another great feature is the printer option. By keying in shift/printer slot, you can print out your own scores, or the ones on disk to study. You can also get hard copy from any of the text files.

I believe that the manual was not designed as a tutorial for three reasons: one, Mr. Boering wants you to experience the thrill of discovery and the joy of accomplishment; two, a tutorial which fully explained all the possibilities of *Ceemac* would probably put the cost of production out of the shoestring category; and three, *too* detailed explanations would stifle your creative and experimental instincts. I believe that the limitations you encounter will be your own, not *Ceemac's*.

About The Author

I could fill many more paragraphs with more features, but I prefer to close this with a word about Mr. Boering. When I ordered *Ceemac*, I said that I hoped it was user-friendly as I was pretty dumb. You can imagine my surprise when I got my check back with a personal letter from Mr. Boering, saying that *Ceemac* was not for everyone, and that it took some understanding of programming techniques to use. I quickly re-ordered, thanking him for his concern, and quite quickly received my disk and yet another very kind letter.

Ceemac is a fine disk for learning and enjoyment. It sets a very fine example of excellent programming, business ethics, and advertising that larger companies would be wise to imitate. □



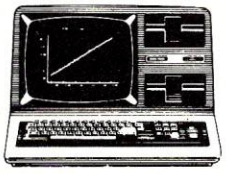
Sample output from a Ceemac *program.*

Figure 1. Sample Ceemac *program from the demo disk.*

```
SCORE: KL-LORI AT HER BEST

:
: INITIALIZE
:
CLEAR [0;0]
SPEED [0;0]
V1 = 5
:    V1 PATTERN'S DEPTH
:
V4 = 7
:    V4 = SYMMETRY
:
: MAIN CHAIN
:
F
: FLIP COLOR OF PATTERNS ON SCREEN
PULSE [1;0]
:
: GET COLOR OF NEXT PATTERN
COLOR = NXTCOL
:
: SET START POINTS OF NEXT PATTERN
XY1 = RANDOM;RANDOM
X2 = $80
:
:
: DRAW PTRN ERACE AFTER 6TH PTRN
FOR V1
  BLINE [0;V4]
  BRASE [$1E;0]
  Y2 = Y2 + V1
AGAIN
CEEMAC  REL 1.0
```


IBM
PERSONAL COMPUTER
IBM P.C. with 64K, 2 Internal dual sided disk drives 7 drive adaptor.
90 DAY WARRANTY
ONLY **2699.95**

TRS-80 MODEL III



48K $849.00
48K, 2 Dr. $1749.00
RS-232 (Installed) $92.00

WE STOCK DISK DRIVES FROM **$209**
Single, Dual, 40 Track, 80 Track

PRINTERS

OKIDATA
ML-82A $425
ML-83A $699
ML-84 $1049 (Parallel)
ML-84 $1299 (Serial)

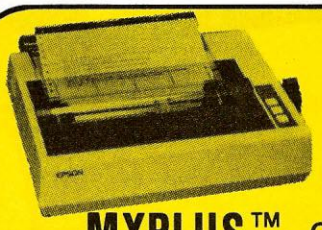
C. ITOH
PROWRITER
10" Parallel $489
10" Serial $639
15" Parallel $719
15" Serial $1295
Call for Starwriter Prices

EPSON
MX-80 $459
MX-80 F/T $525
MX-100 $685
Call for NEW FX Series Prices

THESE ARE OUR CASH DISCOUNTED PRICES. C.O.D. AND CHARGE ORDERS ARE 3% HIGHER. ALL COMPUTERS ARE SHIPPED FREIGHT COLLECT. PRICES, SPECIFICATIONS AND AVAILABILITY ARE SUBJECT TO CHANGE WITHOUT NOTICE. IBM & IBM PERSONAL COMPUTERS ARE TRADEMARKS OF INTERNATIONAL BUSINESS MACHINES INC. TRS-80 AND RADIO SHACK ARE TRADEMARKS OF TANDY CORPORATION

AMERICAN SMALL BUSINESS COMPUTERS
118 SO. MILL ST.
PRYOR, OK 74361
918/825-4844

CIRCLE 108 ON READER SERVICE CARD



EPSON MX-80 AND MX-100 OWNERS

MXPLUS™ GIVES YOU CONTROL OF YOUR PRINTOUT

- SELECT CONDENSED, **BOLD,** OR WIDE PRINT **INSTANTLY** USING THE PRINTER PANEL BUTTONS. (NO COMPUTER CONTROL CODES REQUIRED)
- ACTIVATE PERF-SKIP AND LEFT MARGIN INDENT TO **AUTOMATICALLY** FORMAT YOUR PRINTOUT INTO NEAT PAGES THAT CAN BE PUNCHED AND BOUND.

MXPLUS™ INSTALLS IN MINUTES, NO SOLDERING!

MXPLUS IS A PLUG-IN MODULE FOR ALL EPSON MX-80/100 PRINTERS AND IS COMPATIBLE WITH ALL INTERFACE BOARDS. MXPLUS HAS A 1 YEAR WARRANTY.

ORDER TODAY
ORDERS CALL 24 HR. 800-835-2246 x441
INFORMATION CALL 213-969-2250

DRESSELHAUS COMPUTER PRODUCTS
BOX 929
AZUSA, CALIFORNIA 91702

ONLY **$49.95**
POSTPAID CALIF. ADD 6%
SAME DAY SHIPPING WITH MC/VISA

CIRCLE 165 ON READER SERVICE CARD

Right away, you can see a difference.

Stop in a store near you. Take a look.

You'll be instantly taken with some of the features that make the IBM Personal Computer so different.

Like the non-glare screen—easy on the eyes during those number-crunching tasks like payroll and general ledger.

80 characters a line—with upper and lower case letters for a quick and easy read.

And the flexibility of a system that lets *you* move the components around at will. (To get really comfortable, try the keyboard on your lap and put your feet up.)

Go ahead, compare.

As you progress from casual observer to comparison shopper, you'll want the inside story of the IBM Personal Computer.

Like user memory expandable up to 512KB. And 40 KB of permanent memory. (Which not only includes the BASIC language, but diagnostic instructions that automatically check the system every time you turn it on.)

A 16-bit microprocessor that can improve speed and productivity.

A mix of crisp text and high-resolution color graphics—clearly helpful for creating charts that target forecasts and trends.

Or the 10 programmable function keys that let you bid goodbye to the tedium of repetitious tasks.

And the list goes on. Which is why we've included a box (at right) that tells all.

There's more than meets the eye.

Some of the best things about the IBM Personal Computer aren't part of the computer.

Like the instruction manuals that help you set up our system and teach you to use it with the greatest of ease.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory
16K-512K bytes*
Microprocessor
16-bit, 8088*
Auxiliary Memory
2 optional internal diskette drives, 5¼", 160K bytes or 320K bytes per diskette
Keyboard
83 keys, 6 ft. cord attaches to system unit*
10 function keys*
10-key numeric pad
Tactile feedback*
Diagnostics
Power-on self testing
Parity checking*

Display Screen
High-resolution*
80 characters x 25 lines
Upper and lower case
Green phosphor screen*
Operating Systems
DOS, UCSD p-System, CP/M-86†
Languages
BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL
Printer
Bidirectional*
80 characters/second
12 character styles, up to 132 characters/line*
9 x 9 character matrix*

Permanent Memory
(ROM) 40K bytes*
Color/Graphics
Text mode:
16 colors*
256 characters and symbols in ROM*
Graphics mode:
4-color resolution: 320h x 200v*
Black & white resolution: 640h x 200v*
Simultaneous graphics & text capability*
Communications
RS-232-C interface
Asynchronous (start/stop) protocol
Up to 9600 bits per second

*ADVANCED FEATURES FOR PERSONAL COMPUTERS

And an expanding library of software programs that meet IBM's demanding specifications.

Programs for business. Education. The lab and the home. Programs that make the IBM Personal Computer *your* tool for modern times.

See for yourself.

The quality, power and performance of the IBM Personal Computer are just what you'd expect from IBM. The price isn't.

So stop in and take a look. Visit an authorized IBM Personal Computer dealer and you'll see the difference.

For more information on where to buy the IBM Personal Computer, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

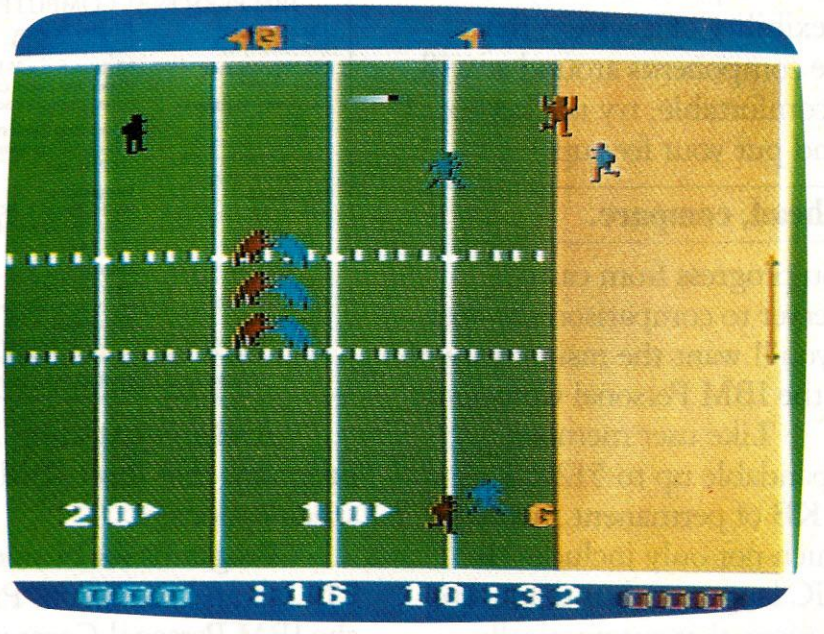
IBM®

The IBM Personal Computer
A tool for modern times

†UCSD p-System is a trademark of the Regents of the University of California. CP/M-86 is a trademark of Digital Research, Inc.

CIRCLE 184 ON READER SERVICE CARD

This Sunday You Can Play Football Against Your ATARI® 400/800™



STARBOWL™ FOOTBALL

It only takes one look to see the incredible realism of STARBOWL™ FOOTBALL by GAMESTAR. With animated players so lifelike, they may go out on strike. Totally involving sounds, from the whoosh of the ball to the cheer of the crowd. And a level of sophisticated play that goes beyond mere videogame systems. Because STARBOWL™ FOOTBALL by GAMESTAR can only be played on an Atari® Home Computer.

Which means you can challenge an allstar Atari® computer team *or* another player to 60 minutes of exciting gridiron action. Run, kick, pass *and* catch. Call your own plays. Even contend with fumbles and penalties!

So grab your playbook, plan your strategy, and get set for Sunday's big game. The Atari® allstars are ready and waiting — in STARBOWL™ FOOTBALL by GAMESTAR. Ask for it at your nearest Atari® dealer.

GAMESTAR

WE BRING OUT THE STAR IN YOU.

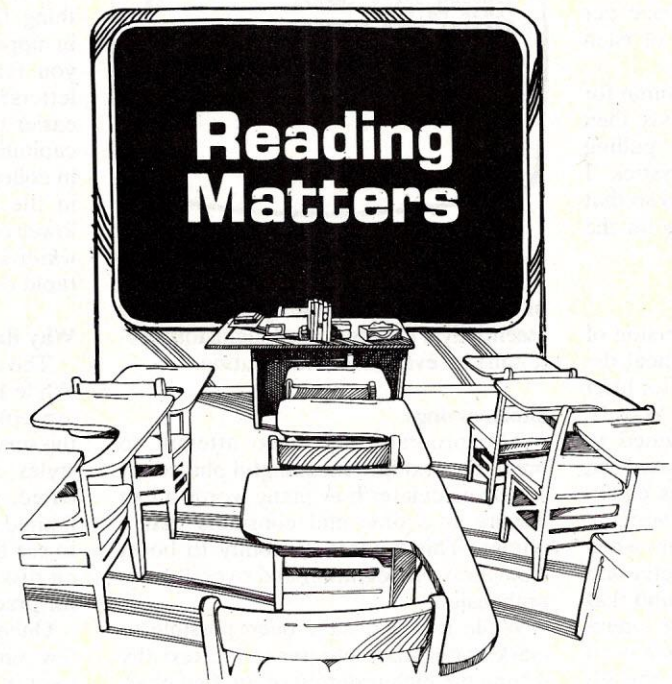
1302 State Street, Santa Barbara, CA 93101 (805) 963-3487

© 1982 GAMESTAR, INC. ALL RIGHTS RESERVED

ATARI AND 400/800 ARE TRADEMARKS OF ATARI, INC.

CIRCLE 175 ON READER SERVICE CARD

creative computing software evaluation



Rising above the glut of "me-too" game programs for the Atari home computers announced at the West Coast Computer Faire last spring is a self-improvement program called *SpeedRead+*. It is a serious attempt to help users boost their reading speed and comprehension by using well designed eye training exercises.

The principle behind *SpeedRead+* is a simple one. If you can train yourself to concentrate on reading text efficiently, you will save time, understand more of what you read, and feel less tired at the end of a long reading session.

To help users achieve these goals, the publisher, Optimized Systems Software, provides a machine language program that flashes words and phrases on the TV screen at speeds from five to five thousand words per minute. Three literary classics are included as text files with the program: Washington Irving's "Rip Van Winkle" and "Legend of Sleepy Hollow," and Bret Harte's "Outcasts of Poker Flat."

Easy to Use

Each eye training exercise is accompanied by tips on how to use it to best advantage. Once an exercise is selected, the user can control both the display speed and the width of the text window by using either the keyboard or the Atari joystick—a nice touch. An option menu and display of the current reading rate are always just a keystroke away.

SpeedRead+ starts by loading the text of your choice into memory, automatically using all the space available. It counts every word of text, so that you can start a session by specifying the very spot at which you left off last time.

The words flash by on the screen, centered under a stationary dot that gives the eyes an anchor in the vast expanse of the video display. The idea is to hold your eyes steady, letting you absorb the information without backtracking or "tuning out." As you feel more confident with the exercise, you can select wider phrase modes (up to 38 characters, nearly the width of the Atari display) to broaden peripheral vision, or you can increase the display speed—or both.

Several Ways to Train the Eyes

From here the alternatives vary, depending on individual needs. A "double phrase mode" displays text alternately on the left and right sides of the screen. This exercise trains your eyes to jump to a predetermined point and instantly recognize the phrases. It also develops the timing and rhythm necessary to read printed text efficiently.

A "random phrase mode" displays text anywhere on the screen, although the user can select the approximate distance from the central stationary dot. The purpose of this mode is to expand peripheral vision, an essential element in speed reading. I found that it took some practice to keep my eyes glued to the dot and still comprehend the text flashing on the screen.

Bud Stolker

creative computing
SOFTWARE PROFILE

Name: SpeedRead+

Type: Self-improvement program

System: 16K Atari 400 or 800,
16K Apple II

Format: Disk

Language: Machine

Summary: Useful tool for developing good reading habits and increasing comprehension

Price: $59.95

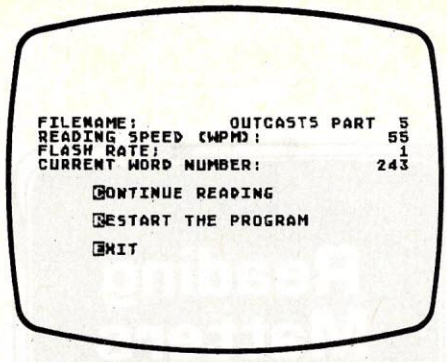
Manufacturer:
Optimized Systems Software, Inc.
10379 Lansdale Ave.
Cupertino, CA 95014
(408) 446-3099

Bud Stolker, Landmark Towers, Apt. 1506, 101 S. Whiting St., Alexandria, VA 22304.

Speedread +, continued...

The "column phrase mode" most closely approximates the kind of reading we all do once we tear ourselves away from the computer. This exercise trains the eyes to travel from top to bottom of a column of text, stopping only once per line and focusing at the center of each line.

The program displays each column for a predetermined number of seconds, then replaces it with more text. By pulling forward or backward on the joystick, I was able to synchronize the speed so that the text changed just as my eyes hit the bottom line of the column.



Intermediate SpeedRead+ menu.

Method Used In World War II

SpeedRead+ is an updated version of the old tachistoscope, a mechanical device that presents visual material for brief periods of time. During World War II, naval aircraft spotters were trained to differentiate friend from foe based on images flashed by tachistoscopes equipped with mechanical shutters. The technique was highly successful. But when they used the machine for character and word recognition, researchers found that average reading rate gains were unimpressive (though some people achieved spectacular gains). To this day the effectiveness of the tachistoscope is an item of controversy. Because *SpeedRead+* is essentially a computerized tachistoscope, it must be evaluated with caution.

Shortcomings

The program makes no attempt to break the text into meaningful phrases; it simply calculates how many words it can display at a time and considers that a phrase. This hinders its ability to boost true phrase recognition and overall comprehension.

While it would have been possible to mark appropriate phrases in the text (by setting the high-order bit of the first character as a flag, for example), this would have entailed a great deal of work, would have raised the cost of the software considerably, and would not have solved the problem of marking user-supplied text.

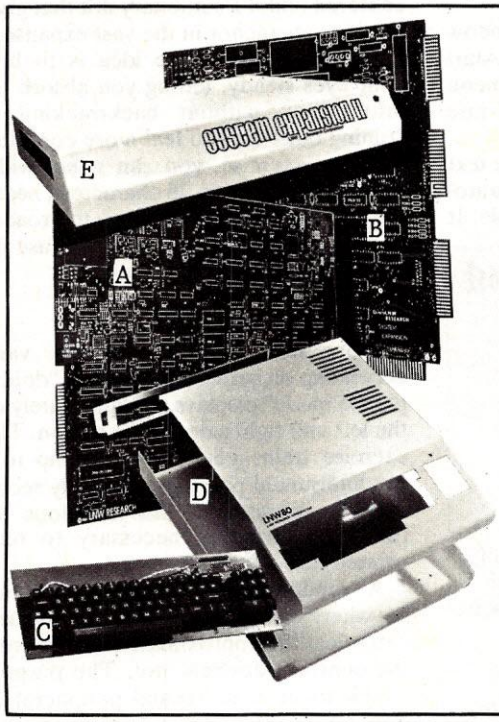
There are other problems, too. For one thing, the three texts are supplied entirely in upper case. When was the last time you read a book printed in all capital letters? Author Zeissman claims that it is easier to recognize words when they are capitalized. I was taught just the opposite in college design classes. He may be right in the case of the Atari, however. Its lower-case character set is so—well, so *whimsical*—that it could interfere with rapid comprehension.

Why Bret Harte?

The choice of texts puzzles me as well. While Bret Harte and Washington Irving are colorful authors, they hardly typify the standard fare of today's readers. Their styles and vocabularies are somewhat dated, and they appeal, I suspect, to a limited audience. I would have preferred to see the *SpeedRead+* manual included on disk so that I could have absorbed it for practice.

Once you have read Harte and Irving a few times, of course, you know every twist in the plots, and I found a tendency to let my mind wander when I should

COMPUTER KITS – FROM $69.95



LNW SEMI-KITS can save you hundreds of dollars. By obtaining your own parts at the lowest possible cost and assembling the **LNW SEMI-KITS**, you can have the most highly acclaimed microcomputer in the industry – the **LNW80**. The **LNW SEMI-KITS** are affordable modules. You can start with a modest cassette system and expand to a full 4Mhz TRS-80 compatible system with 5 or 8 inch double density disks and color at any time.

A. LNW80 CPU – Made of high quality FR4 glass epoxy double sided circuit material, with plated-through holes and gold edge connector. It is fully solder-masked and silk screened. Here are just some of the outstanding features you will have when your **LLNW80** CPU board is fully assembled: • 16K RAM • Color and black and white video • 480 x 192 high resolution graphics • 64 and 80 column video • 4 Mhz Z80A CPU • Upper and lower case display • 500 and 1000 baud cassette I/O –**$89.95**

B. SYSTEM EXPANSION – Expand the **LNW80** computer board, **TRS-80** and **PMC-80** computer with the following features: • 32K memory • Serial RS232C and 20Ma port • Real time clock • Parallel printer port • 5 inch single density disk controller • Expansion bus (screen printer port) • Onboard power supply • Solder-masked and silk screened legend – **$69.95** (tin plated contacts) – **$84.95** (gold plated contacts)

C. KEYBOARD – 74 key expanded professional keyboard – includes 12 key numeric keypad. Fully assembled and tested. – **$99.95**

D. COMPUTER CASE – This stylish instrument-quality solid steel case and hardware kit gives your **LNW80** that professional factory-built appearance. – **$84.95** Add $12.00 for shipping.

E. SYSTEM EXPANSION CASE – This stylish instrument-quality solid steel case and hardware kit gives your **SYSTEM EXPANSION** interface that professional factory-built appearance. – **$59.95** Add $10.00 for shipping.

F. LNW80 CPU – HARD TO FIND PARTS KIT – **$82.00**

G. LNW80 VIDEO – HARD TO FIND PARTS KIT – **$31.00**

H. SYSTEM EXPANSION – HARD TO FIND PARTS KIT – **$27.50**

I. LEVEL II ROM set. (6 chip set) – **$120.00**

VISA and **MasterCard** accepted. Add $3.00 for shipping plus $1.00 for each additional item. All shipments via UPS surface. Add $2.00 for U.S. Mail. Shipments outside continental U.S.: funds must be U.S. dollars. Sufficient shipping costs must be included with payment.

ORDERS & INFORMATION – (714) 544-5744
SERVICE – (714) 641-8850

LNW Research Corp.
2620 WALNUT Tustin, CA. 92680

CIRCLE 115 ON READER SERVICE CARD

Videx INC. T.M.

Videx, a frontrunner in microcomputer peripherals and software, announces two exciting new programs that will make existing software compatible with the 80-column VIDEX VIDEOTERM.

APPLE WRITER][

pre-boot with 80-Column Display

This program allows an 80-column display for your APPLE WRITER][, and access to true upper and lower case input from the keyboard. When combined with the ENHANCER][, this program will provide a complete word processing package.

Interested in word processing in different languages? The pre-boot program has been set up to allow APPLE WRITER][to prompt in other languages. With an Enhancer][, the keyboard can be programmed to be compatible with different languages.

$19.00
Suggested retail price

VisiCalc™

pre-boot with 80-Column Display

Now you can view the VisiCalc electronic worksheet window in 80 columns. Since the entry line is also 80 columns wide, complex formulas can now be seen in their entirety for editing ease. An added bonus is the ability to display upper and lower case.

$49.00
Suggested retail price

For those who need even more power, a more advanced version combines all the above features with the ability to use many of the memory expansion boards currently available. A configuration editor allows VisiCalc to use a mixture of different kinds of memory expansion cards. Just tell it what memory cards you have and which slots they are in. For example, you could use more than one language card equivalent. The memory cards can be combined to give you access up to 176 K of memory!

$89.00
Suggested retail price

897 N.W. Grant Ave. • Corvallis, Oregon 97330 • 503/758-0521

CIRCLE 284 ON READER SERVICE CARD

MING CHALLENGES YOU TO SURVIVE!

MING'S challenge

Ming...Evil incarnate, a hellish entity who by comparison makes Hitler, Stalin, Tiberius, Torquemada, Ivan the Terrible, and the Devil himself look like candystripers...challenges YOU to survive! Think it's easy? Consider:

- You sit, fingering the *kill* button, in your small spaceship at the bottom of the screen.
- Suddenly Ming directs Deathships straight at your fragile craft.
- Next the Claymen, at a signal from Ming, hurtle bombs at you.
- You can neutralize Ming's Deathships by shooting them and placing them in suspended animation.
- Cyclops drop bombs on you and freeze the Deathships, making them disappear into hyperspace (making you lose points).
- If you do not place Deathships into suspended animation they will vanish into the Black Hole and you will lose points.
- Greater perils and varying challenges await you and only the truly TOP game players will survive MING'S CHALLENGE.

As a player, you enjoy the option of altering the parameters endlessly...changing speed of the game, number of enemies, width and depth of the Black Hole. Also, if you are the first to survive MING'S CHALLENGE, you will receive either the next 10 games produced by MICROFUN, free of charge, or any single business product presently available from MICROLAB.

This Program was Written by Mike Livesay.
Available now at your local dealer.
CIRCLE 215 ON READER SERVICE CARD

micro fun™
entertainment division of micro lab

MING'S CHALLENGE plays on Apple II, 48K.
APPLE is a registered trademark of Apple Computer, Inc.

have been concentrating. The author has thoughtfully provided an explanation of how to create new text files using any Atari-compatible text editor (or the Assembler cartridge). A good way to acquire lots of text is to pull it in over the phone lines from a remote system like the Source or Compuserve.

Classroom Use Encouraged

Along with *SpeedRead+* and the text files, OSS includes the framework for an examination program that lets teachers prepare computerized multiple choice tests. The exam system, which includes automatic score keeping, is designed to check students' comprehension levels. Each exam may have up to 255 questions.

The sample test is sketchy indeed, and I couldn't help wishing it had been based on "Outcasts of Poker Flat," a relatively unknown work to many students (and to me). It is probably asking too much of a teacher to make up a computerized exam for each text covered in class, but a school system with several Ataris might use the comprehension exams to advantage.

I suspect *SpeedRead+* will find its way into more homes than classrooms, since it is best used on a regular basis in a quiet place, rather than for a week or two at a time at school.

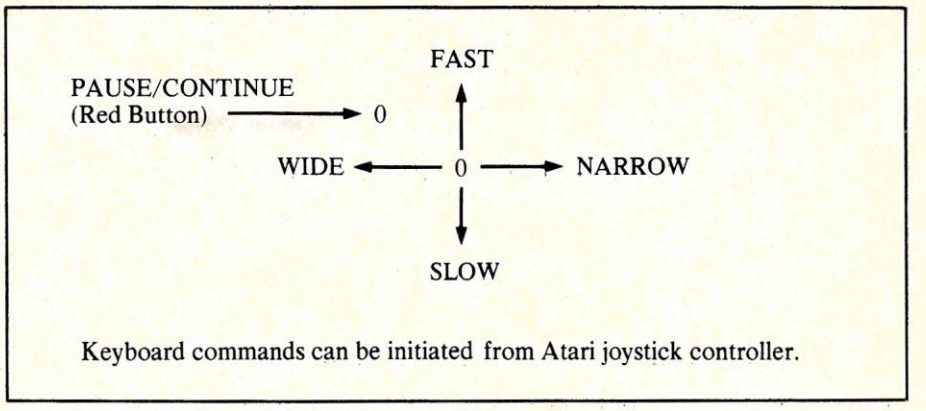
I found *SpeedRead+* a practical and useful tool. The morning paper has always been my nemesis; a careful reading takes as much as an hour a day. By using *SpeedRead+* as an exerciser, I have raised my comprehension level (though without, alas, cutting my reading time). The improvement may be due to the constant reminders in the manual to concentrate while reading, rather than to any improvement in eye movement or phrase recognition. At any rate (pun intended), I am enjoying my reading more now, and I am convinced that *SpeedRead+* has contributed to my pleasure.

Good Manual and User Support

Optimized Systems Software provides an excellent 25-page manual that explains the theory behind each exercise, outlines sample exercise sessions, and gives simple start-up instructions for first-timers too impatient to read the whole manual. The two disks come with a strongly worded licensing agreement.

OSS has an excellent reputation for support of its Atari operating system and Basic upgrades, and can be expected to stand behind this product. They do promise telephone support, though I was unable to find any significant bugs.

There is a hint also of future updates at reduced rates (or no charge) to licensed users. OSS released the Apple disk version of *SpeedRead+* in May, and they hope to have disk versions available soon for the TRS-80 and IBM PC.



Keyboard commands can be initiated from Atari joystick controller.

This program is a welcome reminder that home computers can be much more than game machines. I would like to see more personal development tools of this caliber. *SpeedRead+* has much to recommend it, and I do so without hesitation. □

FIRST and FINEST

In Systems Software for Atari® and Apple®

MAC/65

First we delivered Atari's Assembler Editor (the cartridge).

Then we produced our enhanced "EASMD."

Now OSS is introducing the **finest** integrated assembly language development system yet!

In addition to being ideal for writing small, "quick and dirty" subroutines and programs, **MAC/65** shows its full power and speed when used with even the most complex of large assembly language source files.

Naturally, **MAC/65** is upward compatible with both EASMD and the Atari cartridge. And, of course, the object code output is also compatible with OS/A+, Atari DOS, and/or Apple DOS, as appropriate.

MAC/65 ..... **$80.00***

OS/A+

Optimized Systems Software — the group that produced **both** the **first** Apple DOS **and** the **first** Atari DOS — now brings you OS/A+, which combines the **finest** features of these and other successful personal computer operating systems.

OS/A+ is the **first** and **finest** operating system available for **both** Apple II and Atari computers and features a keyboard-driven, easy-to-use command processor. In addition to several simple resident commands, OS/A+ allows logical and readable requests for even the most sophisticated utility commands. In fact, the user can even add system commands as desired.

But the real power and flexibility of OS/A+ is its ability to easily interface to devices and **disk drives** of virtually any kind and size. File compatibility (with Apple DOS or Atari DOS, as appropriate), device independence, batch processing, easy of use — OS/A+ truly brings the **finest** in operating systems to **your** computer.

AND NOW OS/A+ (for standard Atari or Apple drives) is included as a part of **every** standard OSS language package. Versions of OS/A+ for some higher capacity drives available at extra cost.

Unless otherwise noted, all OSS products require 48K and at least one disk drive. We recommend 64K for the Apple version of OS/A+.

SpeedRead+

The **first** and still **finest** speed reading tutor designed for **you** to use on **your** computer is available **only** from OSS.

SpeedRead+ uses time-proven techniques to train **you** to instantly recognize words and phrases, and yet it goes far beyond what mere mechanical devices are capable of.

SpeedRead+ exercises your peripheral vision, improves your eye movement and timing, and generally works **with you** at your pace... now and in the future.

NOTE: The Atari version of SpeedRead+ needs only 16K of RAM

SpeedRead+ **$59.95**

tiny C

As a product of Tiny C Associates, **tiny-c** was the **first** structured language interpreter for microcomputers. Now OSS brings this innovative interpretive language to **your** home computer. While not having the speed and power a true **C** compiler, **tiny-c** is an excellent choice for the programming student who is ready to begin learning the valuable techniques of structured languages.

tiny-c provides an easy-to-use, easy-to-modify environment that encourages experimentation while promoting proper programming style. The **tiny-c** package includes not only a comprehensive and instructional user manual but also **complete source.**

tiny-c **$99.95***

C/65

NOW AVAILABLE!

The **first** native mode **C** compiler ever produced for Atari **and** Apple computers.

C/65 supports a very usable subset of the extremely powerful and popular **C** language. Just as **C** is used by the most sophisticated programmers from the professional and academic communities, so shall **C/65** prove to be a powerful and much-needed tool for 6502 software developers.

C/65 supports integer and character types (and arrays), pointers, fully recursive functions, and much more.

NOTE: C/65 requires MAC/65 or an equivalent assembler. Two disk drives recommended but not required.

C/65 ..... **$80.00***

TRADE UP

Trade up from Atari's Microsoft Basic to **BASIC A+** and receive a **$15 discount.** Call or write for details.

BASIC A+

"From the authors of Atari BASIC..."

It's a fact! OSS gave you that **first** and **most popular** language for Atari Home Computers. But why be content with the **first** when you can have the **finest**?

BASIC A+ is the **only** logical upgrade available to the Atari BASIC programmer. While retaining **all** the features which make Atari BASIC so easy to use, we've **also** given BASIC A+ features that place it at the forefront of modern interpretive languages. BASIC A+ will let **you** explore the worlds of structured programming, superior input/output, helpful programming aids, and even a very comprehensive PRINT USING command. **And,** exclusively for the Atari computer, an almost unbelievable array of PLAYER/MISSILE GRAPHICS commands and functions.

BASIC A+ **$80.00***

***REMEMBER:** Standard OS/A+ is **included** at no extra charge with BASIC A+, MAC/65, C/65, and tiny-c.

ATARI, APPLE II, and TINY C are trademarks of Atari, Inc., Apple Computer, Inc., and Tiny C Associates, respectively. ***SpeedRead+***, MAC/65, C/65, BASIC A+ and OS/A+ are trademarks of Optimized Systems Software, Inc.

Optimized Systems Software, Inc.,
10379 Lansdale Ave., Cupertino, CA 95014, (408) 446-3099

CIRCLE 222 ON READER SERVICE CARD

Assimilation Aid

Brian Murphy

E-Z Learner came across my desk at the crucial moment — just as I was about to undertake the life-or-death task of learning enough French to keep from starving to death on my first visit to Paris.

Nothing, they say, brings out the good veal like a few compliments on the restaurant's decor when phrased elegantly in French. Unfortunately, though my grasp of grammar is good, my vocabulary as of the time I received *E-Z Learner* was, shall we say, limited.

Setting aside my worries about starving in the culinary capital of the planet, I looked at the brochure which comes with the program. Silicon Valley Systems makes no elaborate claims about this software. They say that the program is simple to use, that it will help you to assimilate large amounts of information and that it will enable you to *learn* the information, rather than merely memorize it for the short term.

I brought all my French manuals together, dumped them beside my Apple II, and booted up *E-Z Learner*. I saw on my monitor a menu and the directive to hit the space bar for instructions, which explained what the nine menu commands did. In about five minutes I was ready to create my first file.

I found out very quickly that what I was about to create was a set of electronic flash cards, which I could tailor to my own needs, including only information I needed. I titled my first file "French Vocabulatory" and plunged ahead.

On screen there were now two blank flash cards. By adding an ! before my entry, I could alter the format to center my question at the top of the card, so I wrote "!un verre." Beneath that I typed "!a drinking glass." I repeated the process about a dozen more times, adding words with which I would need to be familiar and their translations, and then hit control-S to stop.

That command brought me to the first menu for the actual flash card "power review," where I had the options of having the questions put in the original order (the question in French and my translation in English) or in reverse order (with the question in English and me attempting to come up with the answer in French).

Having selected the original order, I landed in a new menu, which offered me the option to start or continue the review, start over (which lands you back in the menu where you decide whether you are asked the question or the answer first), or return to the main program menu. After a brief monitor display indicating that the order of questions was being randomized, the first question came up.

Perfectly centered at the top of the flash card was "un verre." The on screen prompt said to press the space bar for the answer. Attempting to type the answer didn't even make the cursor blink. So I intoned "a drinking glass," hit the space bar and the answer came up, "a drinking glass." A triumph! In order to get the next question I had to type C if I was right or W if I was wrong. I typed C and the next question came up.

I completed all twelve questions, and

Brian J. Murphy, 133 Post Road, Fairfield, CT 06430.

creative computing

SOFTWARE PROFILE

Name: E-Z Learner

Type: Teaching program

System: 48K Apple II, disk drive with 3.3 DOS

Format: Disk

Language: Machine language

Summary: Effective self-teaching tool

Price: $39.95

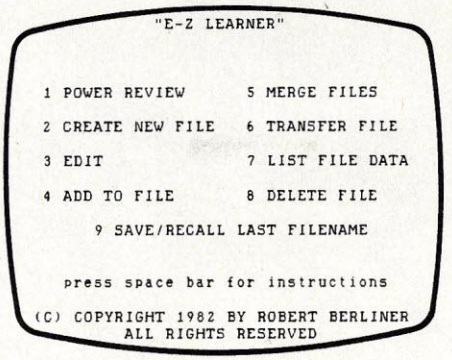
Manufacturer:

Silicon Valley Systems
1625 El Camino Real, #4
Belmont, CA 94002

my monitor informed me that after one review I had eleven right and one wrong. The menu option to start or continue the review brought me back to the question I had wrong. I got it wrong again. The same menu option landed me back on that same question and would continue to do so, I surmised, until I got it right. Once I did, I had the option of starting the review over from the top or going to the main menu.

Did it work? Was I able to expand my vocabulary? The answer is yes. Using the technique of reviewing previously entered questions and then adding new questions to the file daily, I was soon able to translate quickly and accurately ever-increasing amounts of vocabulary. The material stuck with me. I was able to use my new vocabulary in formulating sentences and phrases. I had, as the documentation promised, not merely memorized but *learned*.

This program is perfectly adapted for home use by students who have a great deal of material to learn. I recall, with horror, some of the rote learning I had to do in high school and college. An Apple II with *E-Z Learning* would have been a godsend in those days, as I memorized the steps in the process of cellular mitosis and important dates in U.S. history. Not all learning, after all, is of concepts.



The home user from grade 6 up will have no difficulties using *E-Z Learner*. The instructions are clearly phrased, the prompts are simple to follow and the program offers real flexibility in creating files.

This program is perfectly adapted for home use by students.

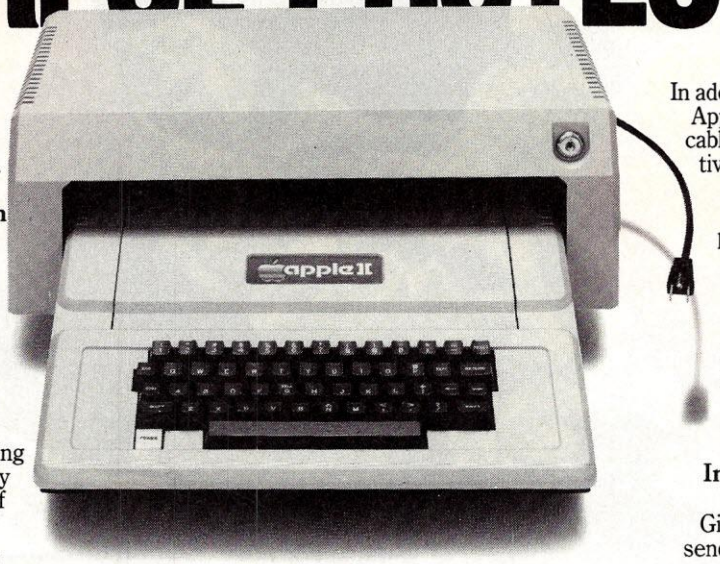
Files are saved on work disks, which means that you can have an unlimited number for future reference and review. Notes transcribed into flash card form on these files can be stored indefinitely and could be a real bonus at final exam time, or when preparing for SAT or GSAT placement tests.

The program enables you to take files and transfer them to disks or to merge them, so that, in a final exam situation, for example, you can take the material you have studied unit by unit and review it as a whole. At any time you can delete a file or, if you have made a mistake, edit individual questions to add, delete, or correct information. Once a file is created, it can be expanded at any time with new questions, the only limit being the storage capacity of your disk.

Teachers interested in using this program in the classroom should note that the program is not really suited for unsupervised review. The program will believe the child if he says he got all the answers right. For students who want to review, for their own benefit, material for examinations or quizzes, the program is ideal, since the file can be tailored to meet the students' exact needs.

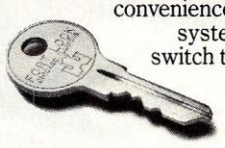
The documentation says the program is menu driven, but it is also motivation driven. If you want to learn, then *E-Z Learner* is a perfect tool for the job. □

POWERFUL PROTECTION



Get Station II and you hold the key that protects your Apple® from theft, unauthorized use, power surges and even power switch failure. With Station II secured, just plug your Apple into one of **three built-in power outlets**, slide it inside and you're covered.

Beyond security, the **key** is also a **power switch** for your Apple, monitor and printer. So you have the convenience of a turnkey system. Plus, the switch takes the wear and tear of re-booting, saving you the costly replacement of your Apple's power supply.



A **surge suppressor** is built-in, too, intercepting power spikes before they can do their damage. And **an optional fan** protects your Apple from overheating.

In addition, Station II pulls your Apple, peripherals, cords and cables together into an attractive, integrated, easy-to-use package. Now **one cord and one wall outlet** power your entire system. Get powerful protection and system convenience for your Apple II. Order Station II today.

Station II.....$129
Fan Kit .....$ 49
(Calif. residents add sales tax)

See your dealer or call 800-24TRACE
In California call collect (415) 964-3115

Give Visa or M/C number or send check to Trace Systems, 1928 Old Middlefield Way, Mtn.View, CA 94043.

FOR APPLE II

trace

®Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 279 ON READER SERVICE CARD

ZENITH
WANG
apple
HEWLETT
PACKARD
hp
IBM

Look Who Picked the Peach.

Did You?

They did.

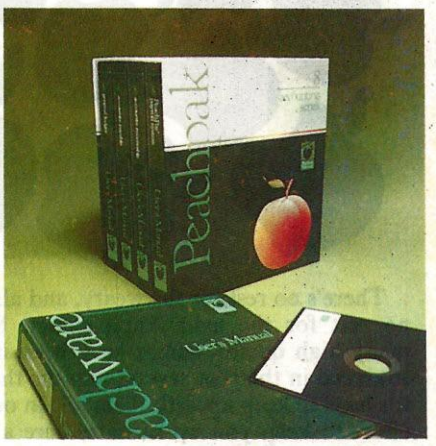
And perhaps you did too. If you own an IBM Personal Computer,™ an Apple III,™ a Zenith Z-89™ or a Hewlett-Packard HP-87,™ you've had the chance to pick Peachware.™ All these companies chose Peachtree Software™ to get the most out of their machines for you.

And with good reason. Peachtree Software is the recognized leader in business software for microcomputers, with a reputation for comprehensive, well-designed packages, easy-to-use documentation and Peachcare™—our own array of support services unmatched in the industry.

With integrated systems like the Peachpak™ 8 Accounting Series—General Ledger, Accounts Payable, Accounts Receivable, Sales Invoicing, Inventory Control and PeachPay™ Payroll—Peachtree offers the manager unprecedented control over his critical accounting activities. And the Peachpak 9 Office Productivity Series, based on the PeachText™* word processor and including the PeachCalc™ Electronic Spreadsheet, Spelling Proofreader, Mailing List Manager and Telecommunications, expands the power of Peachtree Software to all areas of the office.

Those qualities made our software the natural choice of these big manufacturers. But they're not the only ones who've picked a peach. So have tens of thousands of individual users of the better CP/M™—compatible microcomputers.

If you haven't picked the Peach, isn't it about time you did?



*We improved Magic Wand,™ and it's so good we put our name on it.

IBM is a trademark of International Business Machines Corp.
Apple III is a trademark of Apple Computer Inc.
Z-89 is a trademark of Zenith Corporation.
HP-87 is a trademark of Hewlett-Packard Company.
CP/M is a trademark of Digital Research Inc.
Peachware, Peachtree Software, Peachcare, Peachpak, PeachPay, PeachText and PeachCalc are trademarks of Peachtree Software Incorporated, an MSA Company.

Copyright © 1982 Peachtree Software, Incorporated, an MSA Company.

Please send me information on Peachware™ by Peachtree Software. CC 183

Name:_____

Company:_____

Address:_____

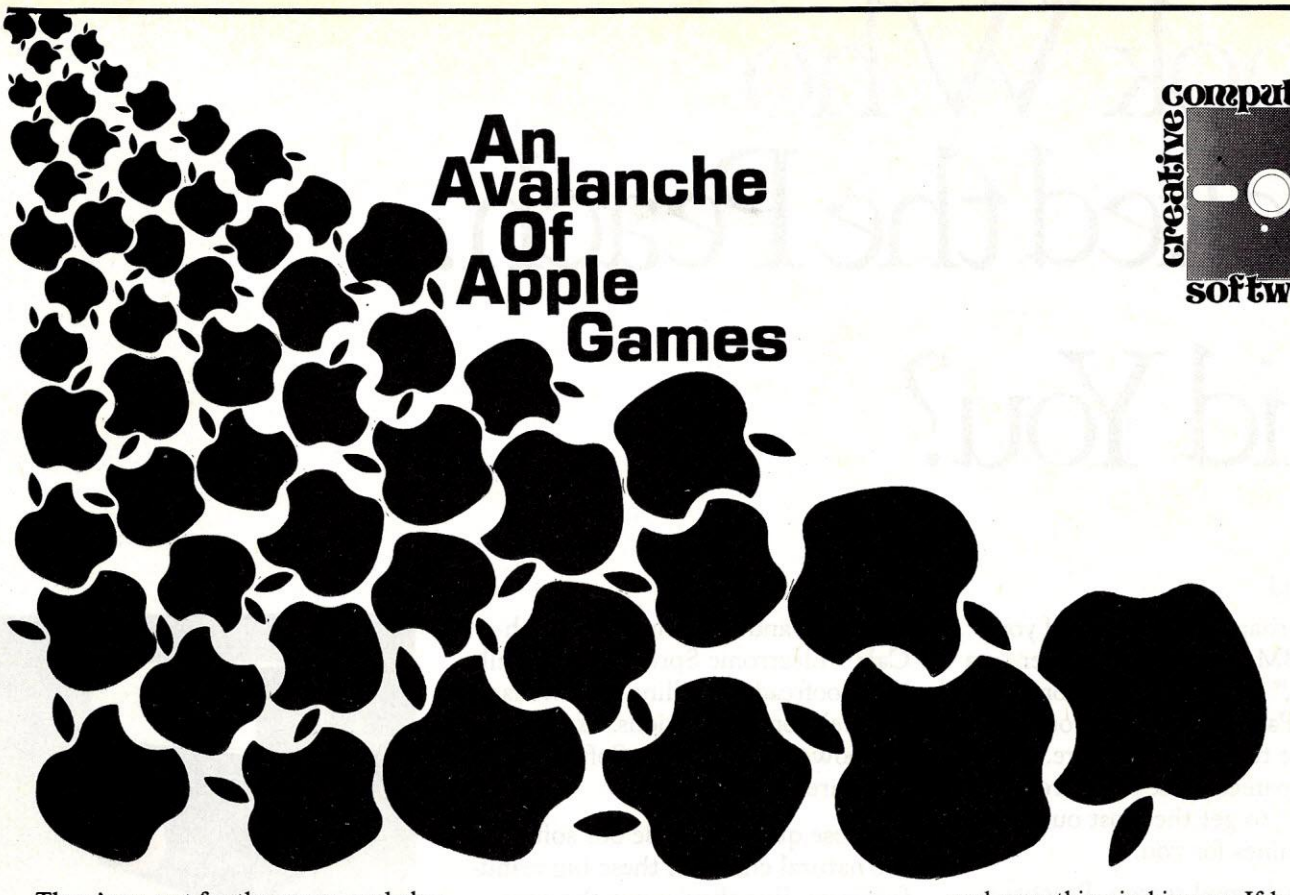
City:_____ State:_____ Zip:_____

I am a: ☐ prospective dealer ☐ user of software

Peachtree Software Incorporated an MSA company
3445 Peachtree Road, N.E. / 8th Floor / Atlanta, Georgia 30326 / (404) 239-2045

Peachtree Software™

CIRCLE 231 ON READER SERVICE CARD



An Avalanche Of Apple Games

creative computing software evaluation

David H. Ahl
Randi J. Rost
Dan Jacobs
Chris Vogeli

There's no rest for the weary, and also no rest for the avid Apple-gamer. So many high quality games have been introduced in the past several months that it's hard to keep up with them all. In our effort to keep you up to date, here are some of our findings.

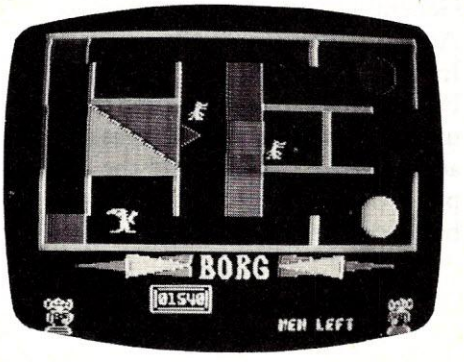
Borg

No, *Borg* is not a Wimbledon simulation in which you attempt to win six straight championships. Rather, it is a superior game in the class that included Datamost's *Thief* and the popular arcade game *Berzerk.* In *Borg,* your mission is to reach The Grud, destroy him and then escape. In order to accomplish this you must navigate through 10 rooms, avoiding dragons and a kangaroo with wings named Borg.

In the first room, the dragons are unarmed; in all subsequent rooms, they have weapons and are intent on putting you out of your misery. Luckily, dragons are by nature dull-witted (you knew that, right?) and will sometimes shoot each other or collide. One must also be wary of the objects in each room, since some are electrified and will cause a quick demise at the slightest touch. If that weren't enough, there's still the small matter of Borg to contend with.

Borg appears just about the time you are getting things under control. You are making for the exit, intent on vaporizing the last couple of dragons when an ominous call for "Borg!" rattles your Apple's speaker. Out hops Borg, straight toward you, crashing through everyone and everything in his way. If he reaches you before you reach the exit, it's goodbye, Charlie.

The rooms themselves are excellent examples of Apple hi-res graphics. The quilt room is typical: patches of color are laid out in a pattern pleasing to the eye, but devilishly tricky to navigate. The figure of a man that you are controlling can run and fire his weapon in eight directions, and the animation is remarkable for a shape so small.



A menu at the start of the program lets you choose which control to use. Options include using either game paddle, a joystick, an Atari joystick connected to a Sirius Joyport, or keyboard controls. I found the Atari joystick made to order for *Borg.* During the game, you can toggle sound effects on or off with CTR1-S or restart the game by pressing CTR1-R.

Hitting the ESC key causes the game to pause so you can answer the phone or

creative computing
SOFTWARE PROFILE

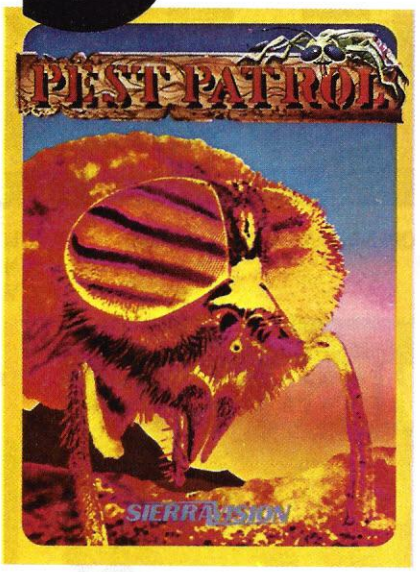
Name: Borg
Type: Arcade game
System: 48K Apple II, II+
Format: Disk
Language: Machine
Summary: Great graphics and action
Price: $29.95
Manufacturer:
Sirius Software
10364 Rockingham Dr.
Sacramento, CA 95827

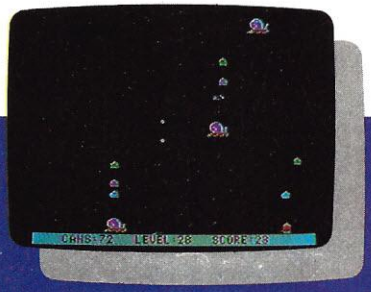
Randi Rost, 1405 Woodland Ave., Fairmount, MN 56031.

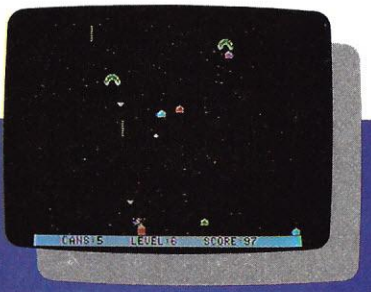
Dan Jacobs, 4509 Dartmouth Ave., Sacramento, CA 95841.

THIS GAME'S GOT BUGS

But you'll LOVE them







For every pesky insect that's ever bothered you - you owe it to yourself to play PEST PATROL. . . . .

Bomb the bugs (and have them bomb you) as you encounter armored snails, butterfly fighters and a swarm of other "insectivorous" irritation, all brought to life in the quick and beautiful HI-RES graphics that you have come to expect from Sierra On-Line.

PEST PATROL offers never-ending challenge from so many different insects that you better not blink while you play. . . it could be fatal!!! They bite, bounce and bomb their way towards you in wave after wave of insect invasion. Can you survive 29 levels of swarming, stinging, strafing insects, or suffer the injury of infestation?!! Find out as you play PEST PATROL!!!!!

PEST PATROL is another fine HI-RES game by Mark Allen, author of SABOTAGE. Requires 48k Apple II/II+ with DOS 3.3. Available at your local computer store for $29.95 or order directly from Sierra On-Line Inc., 36575 Mudge Ranch Rd. Coarsegold, CA 93614.

(209) 683-6858

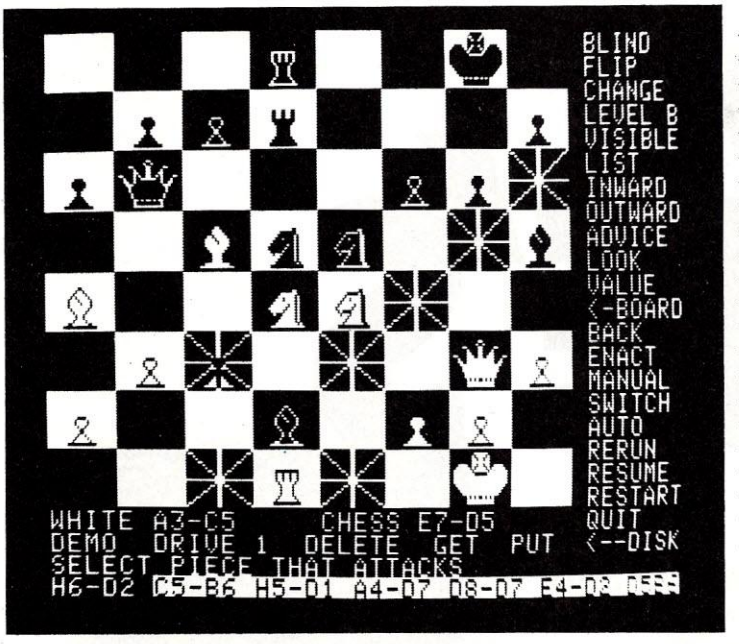
Add one dollar for shipping.

SIERRAVISION

CIRCLE 252 ON READER SERVICE CARD

Sierra ON-LINE INC

Explore the Frontiers of Intelligence



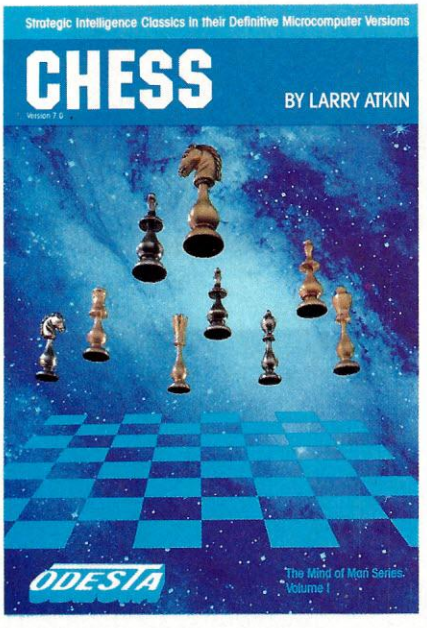
- ◀ Variations of blind-fold play—camouflaged or invisible pieces
- ◀ Invert board to play black on bottom
- ◀ Change pieces on board during game, or set up position
- ◀ Change between 15 levels of play, plus postal and mate-finder modes
- ◀ Show move that **Chess** is thinking about
- ◀ List played moves for each side
- ◀ Lines of force in: attacks and defenses on a square
- ◀ Lines of force out: squares attacked and defended
- ◀ **Chess** suggests a move
- ◀ Show moves **Chess** thinks you will make, and its responses
- ◀ Evaluation of a position
- ◀ Return to board or switch to command menu
- ◀ Take back a move (repeatable)
- ◀ Play move suggested by look-ahead search
- ◀ **Chess** plays neither side
- ◀ Switch sides
- ◀ **Chess** plays against itself—one level against another
- ◀ Replay through most advanced position
- ◀ Skip to most advanced position
- ◀ Start new game
- ◀ Leave program
- ◀ Save, get, and delete games to and from disk

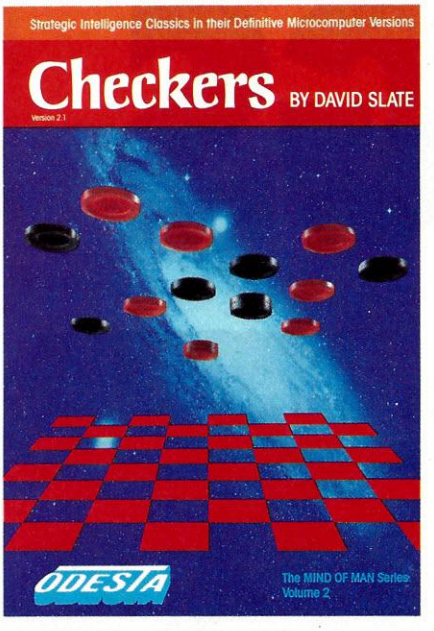
All features self-documented; all choices cursor-controlled
Screen shows "outward" and "look" features being used

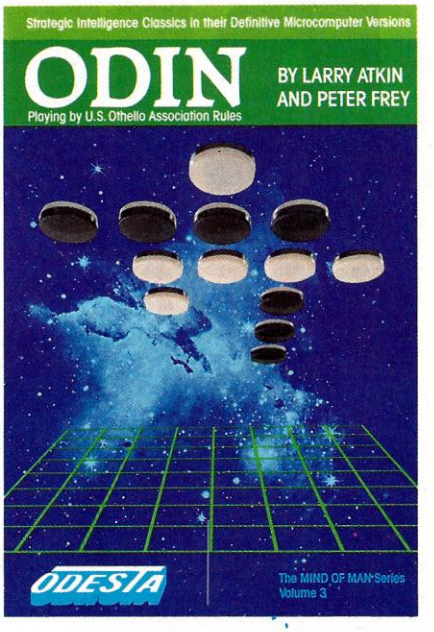
THE PEOPLE BEHIND THE PROGRAMS:

Larry Atkin & David Slate: Authors of the Northwestern University Chess 4.7 program—World Computer Chess Champion, 1977-1980

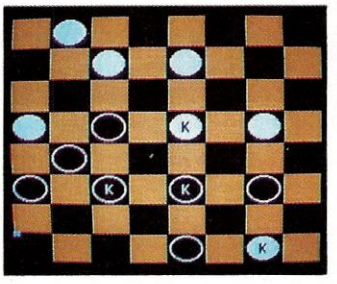
Peter Frey: Northwestern University professor
Editor: **Chess Skill in Man and Machine**
One of U.S. Othello Assoc.'s top-ranked players



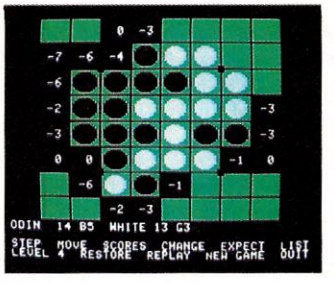




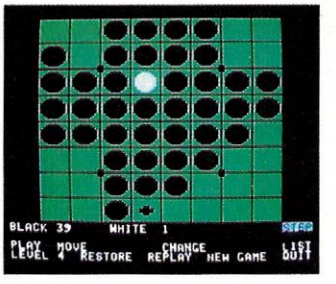
Checkers' features



Black to move and win
(From Checkers documentation)



"Scores" feature in Odin



A clue to the secret of Odin:
Black is destined to lose.

ODESTA

930 Pitner
Evanston, IL 60202
(U.S.A.)

Chess: $69.95
Checkers: $49.95
Odin: $49.95

See your local software dealer, or order (Mastercard or Visa):
800-323-5423
(in Illinois, call 312-328-7101)

For **Apple II, Apple II Plus** 48K disk systems, and **Atari** 48K disk systems. Odin is also available for **TRS-80 Model 1 & 3** 32K disk systems.

CIRCLE 218 ON READER SERVICE CARD

©1982 ODESTA

wipe the sweat from your brow. About the only thing missing is a high score feature. After playing *Borg* for four straight hours, I would have liked to have seen what my best score was.

A color TV or monitor is definitely necessary for playing *Borg*. The color of the obstacles helps a lot in determining which are electrified and which are not. It may take some time to get past the first room, and some may even give up in frustration. If you are looking for an easy game you can master right away, this is not the one. *Borg* is enough to challenge even the championship arcader's skill, but can be a lot of fun for beginners too. If you like Berzerk, you'll love *Borg*, because *Borg* has more—more color, more challenge, and more nail-biting excitement.—*RJR*

Computer Foosball

Foosball lovers unite! You now have an outlet for your frustrations in a new fast-paced simulation of the popular parlor game. *Computer Foosball* is an exciting rendition of this sport, which has playability remarkably similar to the real thing.

The game has one, two, and four player versions which involve a match between the Gruds and the Robots. In the single-player version, you control the Gruds (no offense intended) and your mighty Apple controls the Robots. The first one to score five goals is the winner, and is treated to a few bars of a rousing fight song.

The game begins by prompting for the number of players and the difficulty level. Normal and fast options control the maximum speed of the ball. The normal speed is by no means slow, and will require some practice before your Gruds can avoid embarrassment by the Robots.

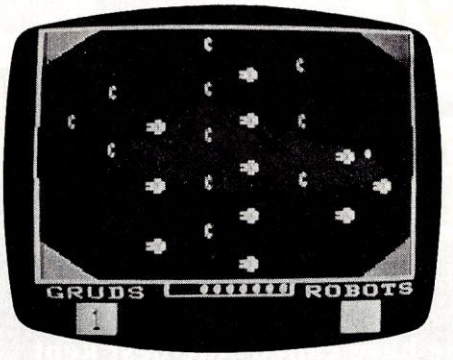
creative computing

SOFTWARE PROFILE

Name: Computer Foosball
Type: Arcade game
System: 48K Apple II, II+
Format: Disk
Language: Machine
Summary: Realistic foosball simulation
Price: $29.95 or free with purchase of Joyport
Manufacturer:
Sirius Software
10364 Rockingham Dr.
Sacramento, CA 95827.

The players are controlled by game paddles, which move them up and down. Pushing the button causes the players to kick the ball. The button is held down to avoid stopping the ball when it is already going the right direction (toward the goal).

Another feature that is notably similar to the actual game is the action in the



corners of the field. The author, Keithen, simulated the banks of the foosball table, which serve to keep the ball in play. If the ball does come to a stop (as it does at times in the real game), hitting CTRL-B will re-serve it. These extra features make the game feel far superior to Pong-like versions I have played before.

The two and four player versions can be even more invigorating. With two people playing, the second player controls the Robots. This may come as a relief; if your opponent is less skillful than the Apple, you may actually be able to win a game.

With this option there is the additional excitement of head-to-head competition, a feature seldom found in Apple games. So what could be better? Four players, of course! This option, available to owners of the Sirius Joyport, is the only one I have seen that enables four players to play simultaneously with all four pushbuttons operational.

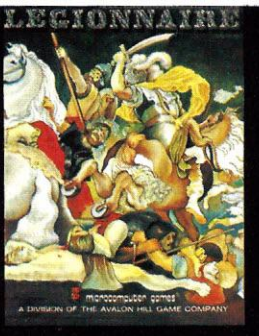
Besides normal retail sales, the game is available free with the purchase of a Joyport. Either way, foosballers and non-foosballers will enjoy the action in this fast-paced game.—*DJ*

Horizon V

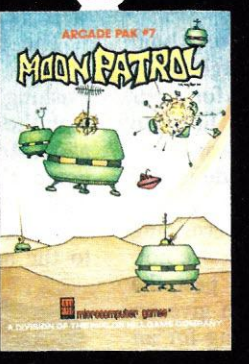
The microcomputer game industry is getting more sophisticated by the day. Game authors have begun to implement multiple scenarios, realistic three-dimensional graphics, and automatic increases in difficulty.

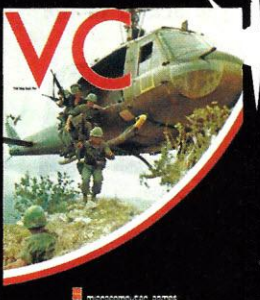
Horizon V is an excellent example of

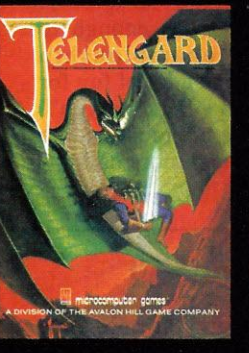
CIRCLE 171 ON READER SERVICE CARD

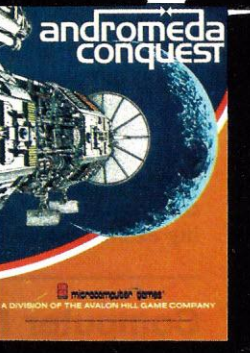


RISING STARS









What some have called "the best kept secret in the game software industry". Unleashed here are six new software games blending advanced graphics with precise elements of playability, challenge and intense fun for every gamer's tastes. Beyond these six new games are 26 more for you to consider . . . all we believe are the best software values for your money!

LEGIONNAIRE—Real-time simulation of tactical combat in Caesar's time. YOU as Caesar command up to ten legions. Finest **full-color graphics** plus playability way beyond the state of the art! Cassette . . . $35.00

V.C.—Faithfully recreates unconventional conflict in Viet Nam. YOU command chopper and artillery units, and face task of protecting civilian population where the enemy hides among the people. Cassette . . . $20.00
Diskette . . . $25.00

G.F.S. SORCERESS—Sci-Fi adventure game. YOU are Joe Justin trying to clear yourself of a false charge of mutiny and get back to the Galactic Federation Starship "Sorceress". Beautiful full-color manuals provide useful clues. Cassette . . . $30.00 Diskette . . . $35.00

ANDROMEDA CONQUEST—Vast scale space strategy game of galactic colonizing and conquest among unique star systems with strange life forms and alien technologies that provide exciting exploration and battle. Cassette . . . $18.00 Diskette . . . $23.00

MOON PATROL—Arcade Pak™ game of lunar invasion. Beats any quarter-gobbling game around! Four levels of increasing difficulty present new attackers to battle. Fast, furious and fun! Cassette . . . $25.00

TELENGARD—Dungeon adventure in a mysterious underworld with 50 levels of ever-more-complex mazes to explore. Real time fantasy and role-playing game. Using wits, magic and fast thinking, gamers fight monsters and reap valuable rewards. Cassette . . . $23.00
Diskette . . . $28.00

® Trademarks for Tandy Corp., Apple Computer, Warner Communications, International Business Machines and Commodore International Ltd.

Available at finer computer stores everywhere!

AH QUALITY

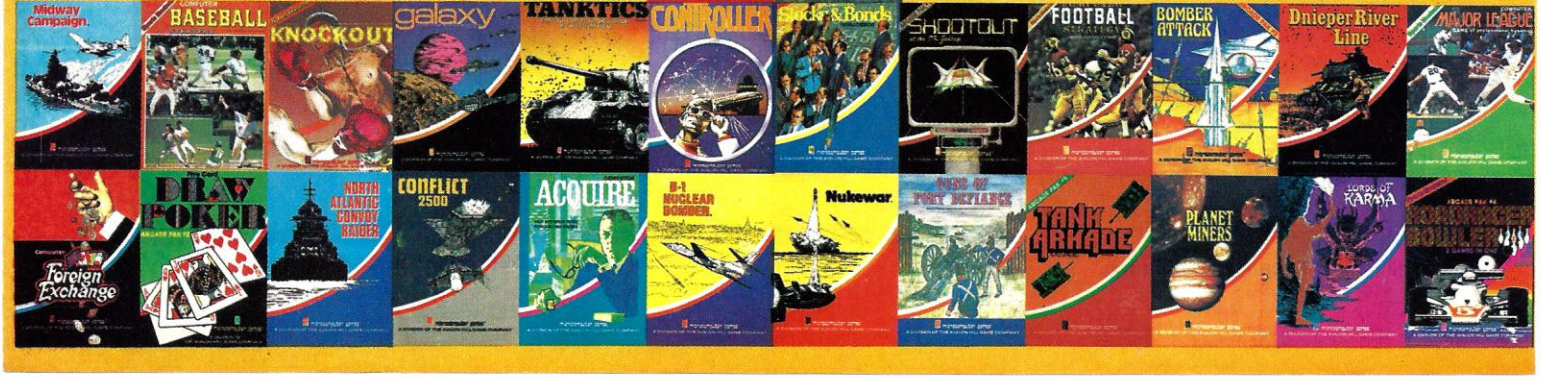
If your favorite dealer fails to have the games you want, call us toll free
1-800-638-9292
CIRCLE 116 ON READER SERVICE CARD

microcomputer games

® REGISTERED TRADEMARK OF MICROCOMPUTER GAMES, INC. DIVISION OF
The AVALON HILL Game Company

Avalon Hill MICROCOMPUTER GAMES are compatible with the following computer systems:
. TRS-80 Models I/III & Color®
Apple II®
Atari 4/800®
IBM P.C.®
Commodore VIC-20, CBM PET & 2001®

For specific information, such as machine compatibility, memory requirements, cassette or diskette availability and price, call us toll-free 1-800-638-9292 and ask for Operator 20, or write:
Avalon Hill Microcomputer Games, Dept. M-20
4517 Harford Road, Baltimore, MD 21214



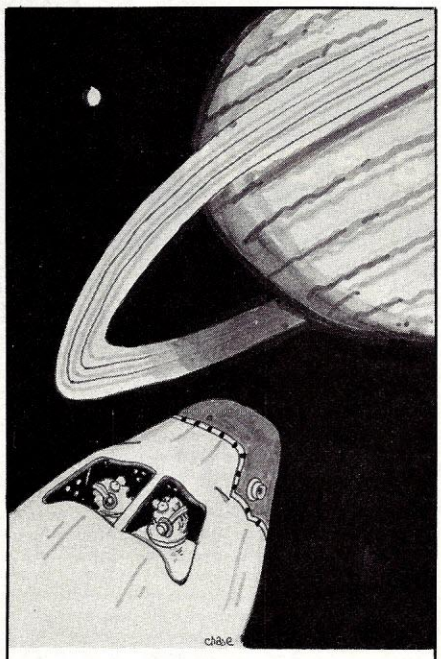
what a little imagination and some programming prowess can produce. A graphical masterpiece by Nasir Gebelli, it catches your eye immediately and beckons you to play.

The game starts by prompting for the mode of control—keyboard or joystick. It also has an option for modifying the keyboard. This is a feature I would like to see become standard in the future. Although there is no prompt for it (and there is no mention in the instructions), the game is compatible with the Sirius Joyport (hit control/shift/P).

In the first part of the game, you are hovering just above the surface of a gridded planet. Checking your radar display in the upper right of the screen (a la Battlezone), you spy the dots that represent the angry G-bellians, who think you've kidnapped Paulette the G-belly dancer.

The G-bellians are obviously not familiar with our "innocent until proven guilty" concept, and proceed to attack. You have a limited amount of fuel, and must shoot as many adversaries as possible before trying to refuel.

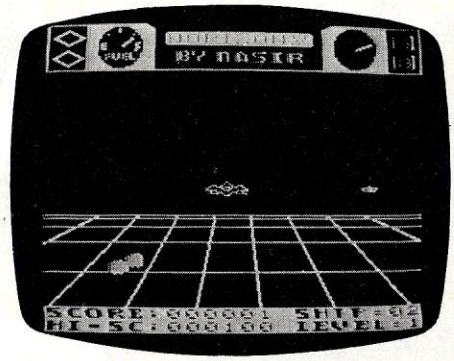
The ship you are in always faces one direction, so maneuvering involves using the controls to move forward, backward, and laterally. This is made even more challenging due to a mysterious random wind of some type that tries to change your trajectory. It is the ability to counter this randomness quickly that separates the good players from those who are merely target practice for the G-bellians.



"Sure, it's impressive, but I like the computer enhanced photographs better!"

Before you know it, you find yourself low on fuel, and must abandon your dogfight to get more. This is accomplished by checking the fuel direction indicators which tell you where the time tunnel entrance is. If you can hover above it long enough, you will be whisked into the tunnel, where you must shoot more G-bellians.

However, here they are worth only 100 points each, whereas above the planet a shot could earn up to 600 points. This means strategy for high scores involves staying on the surface as long as possible, despite the risk of running out of fuel. This part of the game is sure to cause the player mental anguish and heart palpitations.



As if that were not enough, you still must shoot a number of these guys before you can proceed. Next stop is the fueling area, which appears as a series of growing concentric rings, a beautiful graphics effect.

By centering a crossmark in the middle (battling the mysterious wind all the while) you earn enough fuel to return to the surface. The planet has now changed colors, and the G-bellians are more aggressive.

The game continues in this cycle for as long as you can hold out. When the G-bellians have finally won out, high

creative computing
SOFTWARE PROFILE

Name: Horizon V
Type: Arcade game
System: 48K Apple II, II+
Format: Disk
Language: Machine
Summary: Superb 3-D Shoot-em-up
Price: $34.95
Manufacturer:
Gebelli Software, Inc.
1787 Tribute Rd., Suite G
Sacramento, CA 95816

CIRCLE 172 ON READER SERVICE CARD

A SPEECH SYNTHESIZER ON A DISK!

That's why Apples and Ataris are saying: "Talk Is Cheap"

IT'S CALLED THE SOFTWARE AUTOMATIC MOUTH, S.A.M. FOR SHORT

It's a high quality speech synthesizer created entirely in software. You use it as a software utility, load it into RAM, and then use your machine as usual, except now you can make your programs talk. It generates the speech sounds on demand, so there is no limit to what it can say.

When you hear S.A.M., you'll probably agree that it sounds better than all the hardware speech synthesizers for Apple or Atari computers. And, it has a truly remarkable price.

YOU CONTROL INFLECTION, PITCH AND SPEED

With its user-variable inflection, S.A.M. can accent words on the right syllable and emphasize the important words in a sentence.

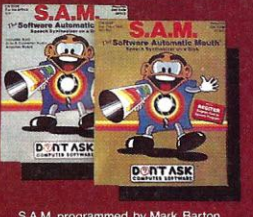
You can also make S.A.M.'s speech higher or lower, and faster or slower, over a wide range of settings.

USE EASY PHONETIC INPUT OR PLAIN ENGLISH TEXT

S.A.M. understands a simple phonetic spelling system, not a mysterious alpha-numeric code. S.A.M. helps you learn phonetic spelling by showing you your mistakes, and the owner's manual gets you started with an English-to-phonetics dictionary of 1500 words. So it's easy to make S.A.M. produce exactly the sounds you want.

But suppose you want to type ordinary English, or you want your machine to read a word processor file aloud. The S.A.M. disk comes with RECITER, an English text-to-speech conversion program that lets S.A.M. speak from plain English text.

S.A.M.



S.A.M. programmed by Mark Barton.

ADD SPEECH TO YOUR PROGRAMS WITH EASE

In a BASIC program, you add speech with just a couple of commands. In a machine language program, it's just as easy. S.A.M. comes with four demonstration programs to show off its distinctive features and help to write your own talking programs. Write adventure games with talking characters, educational programs that explain aloud, or utilities with spoken prompts – put your imagination to work.

You can order S.A.M. directly from DON'T ASK. Add $2.00 for shipping and handling to your check or money order (or order C.O.D.)

S.A.M. for the Apple II/II+

Includes an 8-bit digital-to-analog converter and audio amplifier on a board. Only **$124.95**

Requires 48K, disk. (S.A.M. takes up to 9K; RECITER 6K.) You will also need a speaker.

S.A.M. for the Atari 400/800

S.A.M. talks through your television speaker. No additional hardware is required. Only **$59.95**

Requires 32K, disk. (S.A.M. takes up 9K; RECITER 6K.) Note: to produce the highest quality speech, S.A.M. automatically blanks the screen during vocal output; the display is preserved. S.A.M. can talk with the screen on, but the speech quality is reduced.

DON'T ASK COMPUTER SOFTWARE INC.

2265 Westwood Boulevard, Suite B-150
Los Angeles, California 90064
Telephone: (213) 397-8811

Hear S.A.M. at your favorite computer store today!
Dealer inquiries welcome.

CIRCLE 181 ON READER SERVICE CARD

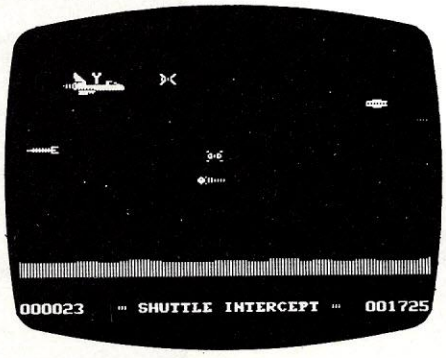
Production: EUROSTYLE GRAPHICS (213) 393-5728

Apple is a trademark of Apple Computer, Inc. • Atari is a trademark of Atari, Inc.

scorers' names are recorded with up to six letters, a nice touch that will keep you coming back for more—*DJ*

Shuttle Intercept

The object of *Shuttle Intercept* is to retrieve friendly satellites. At your disposal you have a high speed space shuttle, which always flies at the left side of the screen. Its vertical position is controlled by a paddle controller.



To start the game you press the paddle button once and the bay doors open. A second press raises your sky hook and fires your laser cannon. To retrieve a satellite, you must touch it with the upper part of your sky hook, which must be fully extended. Merely flying over it with your craft does you no good.

Unfortunately, in addition to friendly satellites, there are also enemy flying saucers, satellites, meteors, and missiles flying in the same air space. Each of these must be dealt with somewhat differently. Enemy craft and satellites can be destroyed with your laser cannon. If they are not destroyed, enemy satellites will destroy your shuttle while enemy craft will simply push down your sky hook and close the bay doors.

Meteors and missiles, on the other hand, must be avoided by skillful piloting of your craft. Meteors fly in a predictable course and are relatively easy to avoid, except if they are too close to a satellite you are trying to retrieve. On the other hand, missiles will track your shuttle and destroy it. I found the best strategy was to wait until they got close and then quickly move out of the way.

The game has four levels of play of increasing difficulty. In addition, at 5000 points, the speed of the missiles increases, and at 10,000 points the meteors begin to travel faster. Frankly, I was pleased with scores of two or three thousand. Any score over 1000 allows you to enter your name or initials as the higher scorer for a session, but scores are not saved on the disk.—*DHA*

creative computing
SOFTWARE PROFILE

Name: Shuttle Intercept
Type: Arcade Game
Author: John Van Ryzin
System: 48K Apple, disk drive, paddle
Format: Disk
Summary: Retrieve Satellites
Price: $34.95
Manufacturer:
Hayden Software
50 Essex St.
Rochelle Park, NJ 07662

Star Maze

Your mission is to find the nine power jewels in each level of the *Star Maze* and return them to your mother ship. Do this for all 16 levels and you become an Ace. That is an understatement! I had a tough time just retrieving five or six jewels on the first level.

In this game, you are flying a small space ship around the corridors of a maze. The maze is considerably larger than will fit on the screen, so you see only a small portion of it at one time. The program employs outstanding graphics which cause the maze to scroll by in a direction corresponding to your direction of movement.

You start out at the mother ship with a full fuel tank, three anti-matter bombs, and high hopes. A power jewel may be picked up by flying over it at a speed of 200 or less. This sometimes proves to be quite a challenge because, although it is relatively easy to locate the jewels, it is not always easy to slow the momentum of your ship sufficiently that you can

creative computing
SOFTWARE PROFILE

Name: Star Maze
Type: Arcade Game
Author: Gordon Eastman
System: 48K Apple, disk drive
Format: Disk
Summary: Space Jewels for the picking
Price: $34.95
Manufacturer:
Sir-Tech Software, Inc.
6 Main St.
Ogdensburg, NY 13669

 CIRCLE 173 ON READER SERVICE CARD

Actua

The size, of course, is a dead giveaway. But don't let the size fool you. The HX-20 is not a toy. Or a glorified calculator.

It's a computer.

A real computer, with 16K RAM (optionally expandable to 32K), and 32K ROM (optionally expandable to 64K), RS-232C and serial interfaces, a full-size ASCII keyboard, a built-in printer, a scrollable LCD screen, and sound generation. A micro-cassette and ROM cartridge are available as options.

Viva la différence!

In fact, the only differences between the Epson HX-20 and an ordinary computer are:

1) The HX-20 is small enough to fit inside your briefcase;
2) It'll run on its own internal power supply for 50-plus hours, and fully recharge in less than eight;
3) It gives you up to 10 program functions at the punch of a button;
4) It lets you interface with peripherals like the MX Series printers for correspondence quality output, the CX-20 Acoustic Coupler for remote communications, a barcode reader for inventory control, and an audio cassette for loading and saving programs;
5) It lets you shut the whole unit off while preserving all programs in RAM; and, last, but far from least,
6) It costs less than $800. That's right—less.

The perfect traveling companion.

With the Epson HX-20 and the optional RAM expansion, you'll be able to compute just about anywhere. Because its nickel-cadmium batteries and a low-power, all-CMOS memory keep the HX-20 running for over 50 hours. And even if you shut the HX-20 off, a low-voltage system maintains all programs you have in RAM.

Little screen, big picture.

The HX-20's unique scrollable LCD screen is the ultimate answer to the question, "How do you get a big screen in a small space?" You just show part of it at a time.

l size.

Optional Microcassette

So with the HX-20, you can do programming, word processing and data entry just like you've got a big screen, up to 255 characters wide, with easy-to-read upper and lower case letters, numbers and punctuation and any 20 column by four line part of it visible by user command.

Built in hardcopies.

The HX-20's built-in 24 column dot matrix impact microprinter hands hardcopies to you at 42 LPM, in a crisp, precise 5x7 matrix. It even has bit addressable graphics to give you a pint-sized sales chart, and enough international symbols to print most Western languages.

Epson makes more and better printers than anyone else in the world. Need we say more?

The best is yet to come.

When you hold an HX-20 in your hand, you're not only holding a lot of capacity, you're holding a lot of expansion.

There's a standard cassette interface, a cartridge interface, the RS-232C and serial interfaces, and a system bus that lets you expand RAM and ROM capabilities. There's even a floppy disc drive for maxi capacity in a mini package.

The Epson edge.

Surprised that a computer like the HX-20 should come from Epson? You shouldn't be. Because we've been building computers in Japan since 1978. And we've been practicing ultra-high-quality precision manufacturing for a lot longer than that.

We didn't jump right into the American microcomputer market. We could afford to bide our time; to wait for the product that was going to stand America on its ear.

This is it.

The Epson HX-20.

EPSON

EPSON AMERICA, INC.

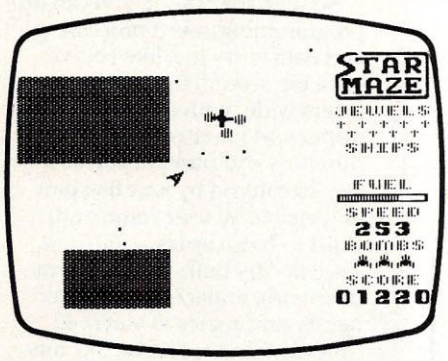
COMPUTER PRODUCTS DIVISION

3415 Kashiwa Street
Torrance, California 90505
(213) 539-9140

CIRCLE 168 ON READER SERVICE CARD

pass over them at such a slow speed.

Furthermore, to drop the jewel off at the mother ship you must also be travelling slower than 200. In fact, if you fly over your mother ship with a speed of 100 or less, you will also refuel. The need to refuel is indicated by both a fuel gauge and an audible warning.

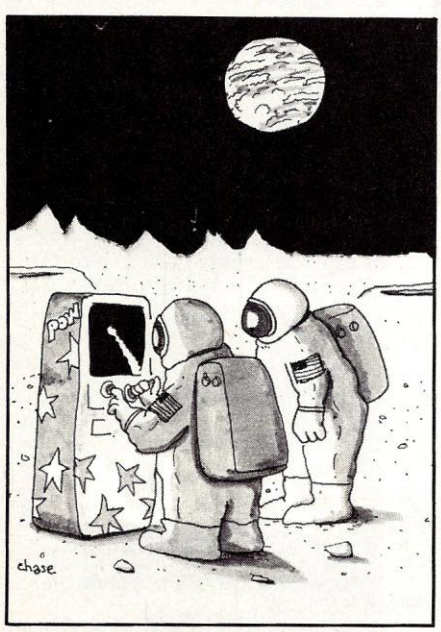


You have three star fighters with which to complete your mission. Flying around the maze, you will find alien cruisers, scout ships, saucers, UFOs, meteors and even a strange little train of outer space bugs. You can destroy an enemy either by shooting bullets at him (bullets in an outer space game?) or by firing an anti-matter bomb.

In a tight situation, you may also elect to enter hyperspace which transports you to another part of the maze. This is not always a good idea since hyperwarp uses a great deal of fuel and you may wind up in the middle of a screen full of enemy ships.

The game may be played from a keyboard, with a standard joystick, or with a switch-type joystick with the Sirius Joyport. Frankly, I found none of them entirely satisfactory. In keyboard mode, ten keys are in use, although only six are used regularly. That's too many for my uncoordinated fingers. Regular joystick mode is somewhat easier, although you still need the keyboard to detonate anti-matter bombs or enter hyperspace. But perhaps I am just being petulant because I was never able even to come close to mastering the game.

However, at the risk of adding yet another control, I feel that a speed break would increase the playability of the game. On the other hand, the momentum of the ships is very realistic and perhaps is what one ought to expect in outer space.—*DHA*



Seafox

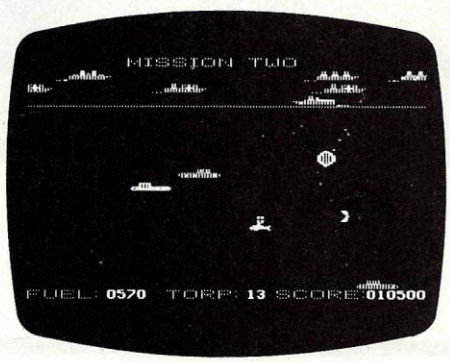
As a submarine captain of the Seafox, you must destroy all of the merchant ships (the top row of ships on the screen) in order to move on to the next mission. Hampering you are other submarines which try to ram you or shoot torpedoes at you. Also, hospital ships frequently come between you and the merchant ships.

If one of your torpedoes hits a hospital ship, it bounces off it harmlessly and heads for the ocean floor. Unfortunately, during this time you are unable to fire anything and are at the mercy of the enemy submarines, and only skillful maneuvering can insure your survival.

Skillful maneuvering is increasingly necessary on advanced missions as you dodge exploding depth charges, torpedo fire, and magnetic mines.

Your sub has a limited supply of fuel and torpedoes which mut be replenished frequently. Occasionally, a supply sub passes by near the ocean bottom and releases a trained dolphin carring fuel and torpedoes. You must make contact with the dolphin's supply pack in order to resupply your vessel. If your sub harms the dolphin, watch out! He has many friends in these waters and they don't take too kindly to it. Giant clams may also interfere with refueling so it is best to collect your supplies quickly.

Your submarine may be controlled by either the keyboard or a joystick. Paddle control is also theoretically possible, but nearly impossible for normal humans. I also found keyboard control very difficult since 11 keys are used to control directions, and firing. A self-centering joystick is by far the most satisfactory. However, both firing buttons must be operational since button O fires torpedoes up and button 1 fires them forward. Although you may move your sub in any direction, forward is always to the right side of the screen. Thus, the only way to get a submarine approaching from the left is by using your upward torpedo when you are under it.



On the lower levels, I found *Seafox* considerably easier to play and much less frustrating than several of the other submarine games on the market. Although the hazards increase on the upper levels, I generally had a nice sense of accomplishment as I progressed through the game. My applause goes to Ed Hobbs for creating a game which can be enjoyed by clods and experts alike.–*DHA*

creative computing
SOFTWARE PROFILE

Name: Seafox
Type: Arcade Game
Author: Ed Hobbs
System: 48K Apple, disk drive, joystick recommended
Format: Disk
Summary: Challenging underwater battle
Price: $29.95
Manufacturer:
Broderbund Software, Inc.
1938 4th St.
San Rafael, CA 94901

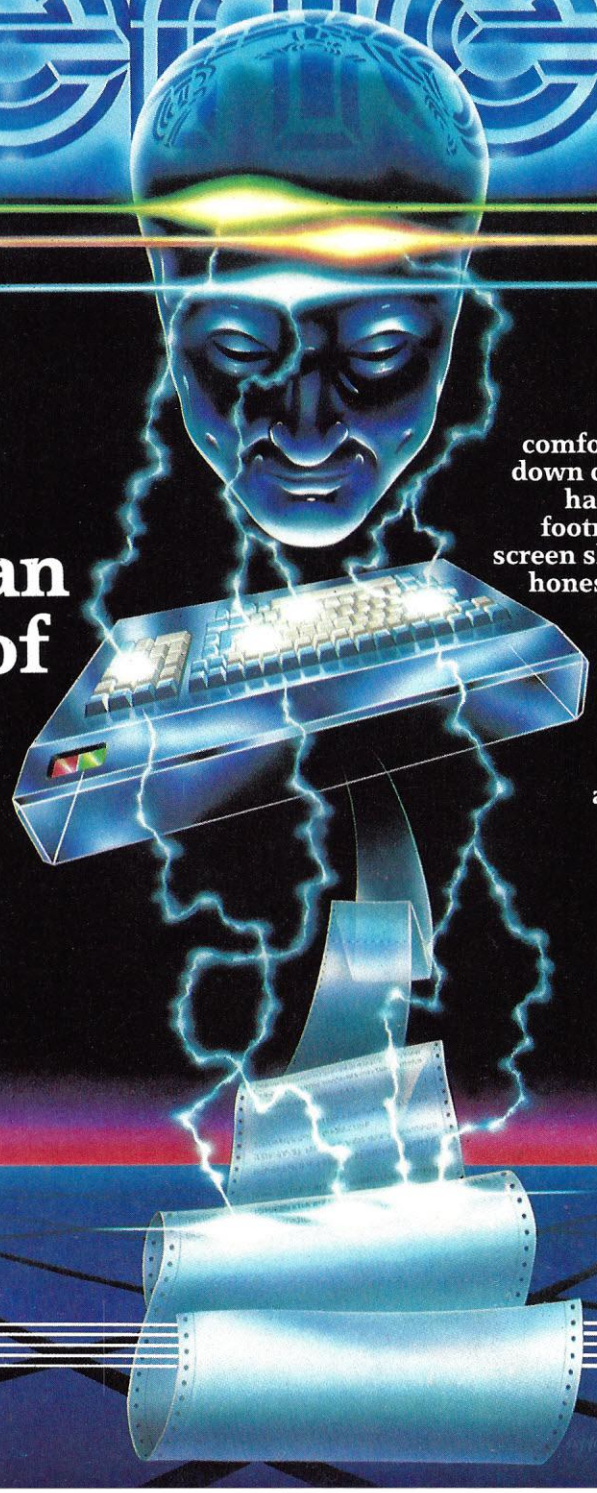
Mars Cars

On the package we read: "On the War God's planet, his vicious Mars Cars have been programmed to sense, search out, and destroy any alien adventurer, who dares seek his timeless treasures. And on Mars, you are the Alien!

"Enter this inter-planetary battle of wits and agility. Travel 16 danger filled levels, defeat the killer Mars Cars and return to earth with a King's ransom."

At your disposal you have a tough little excursion vehicle. The planet is far different than you were ever led to believe by the Viking Probes or telescope observation. There are no canals, no deserts, no ravines. Instead you find a series of lightweight barriers. These may be easily destroyed by simply ramming

WordPerfect



A word processor should be an extension of your mind.

A good word processor should feel comfortable, and let you put your thoughts down quickly, almost effortlessly. It should have automatic everything, and include footnotes, merge, columns and math. The screen should be uncluttered and give you an honest view of your text without annoying codes.

WordPerfect does all this and has proven itself at places like Harvard, RCA, State Farm, and Texaco. The software is well documented, is guaranteed, and is available for immediate delivery. For more information write or call

Available for IBM Personal Computer and Data General Computers.

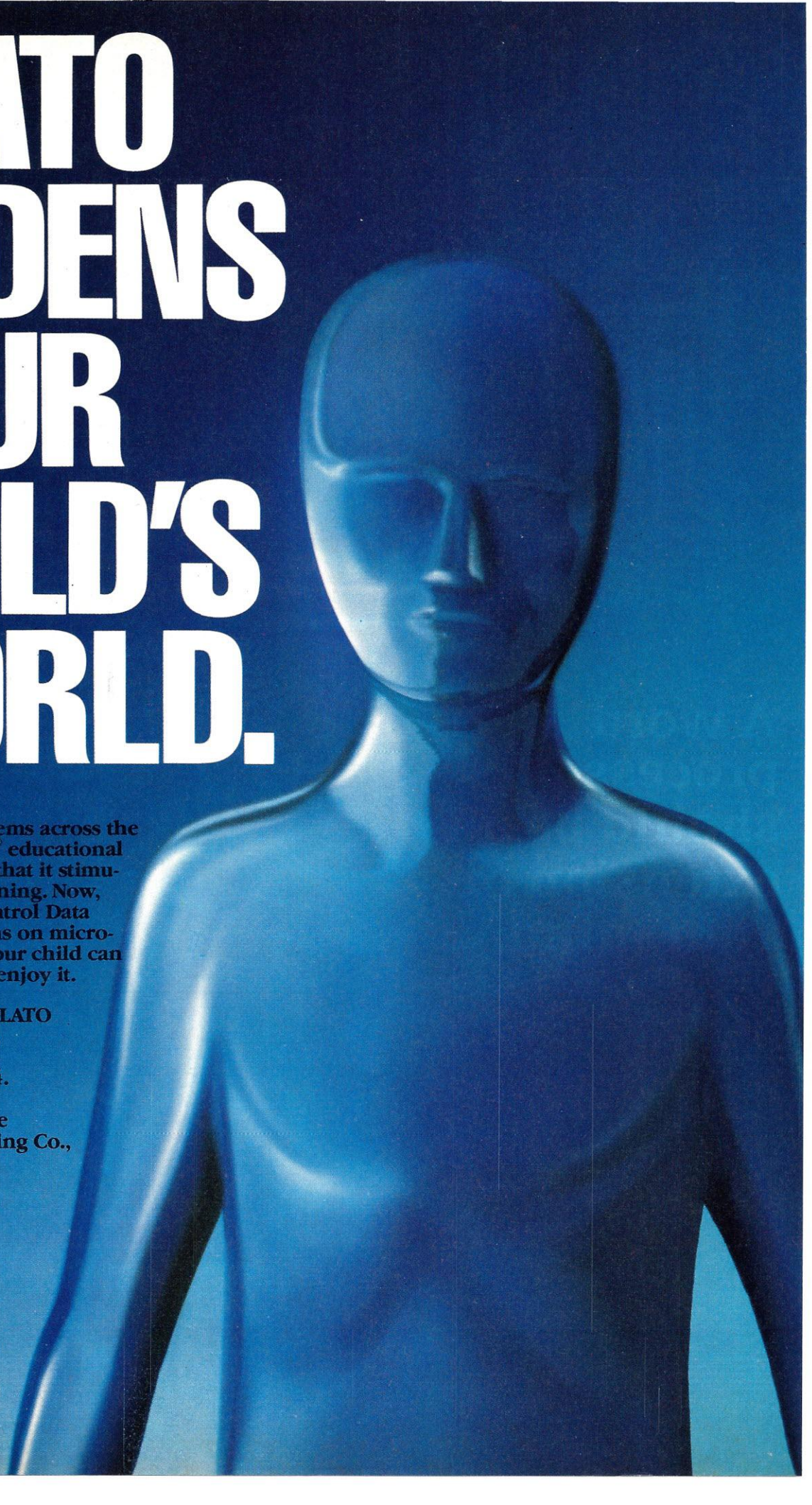
SSI

SATELLITE SOFTWARE INTERNATIONAL

288 WEST CENTER
OREM, UTAH 84057
(801) 224-8554 (800) 321-5906 TELEX 453-168

CIRCLE 270 ON READER SERVICE CARD

PLATO WIDENS YOUR CHILD'S WORLD.



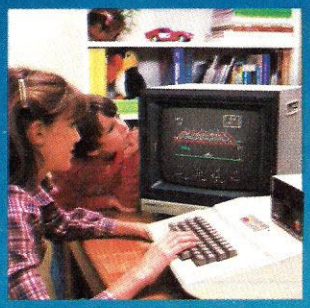
In public school systems across the United States, PLATO® educational software has proved that it stimulates and speeds learning. Now, for the first time, Control Data has put PLATO lessons on microcomputer disks, so your child can learn at home—and enjoy it.

For information on PLATO educational software, or to order, call toll free 800/233-3784. In California, call 800/233-3785, or write Control Data Publishing Co., P.O. Box 261127, San Diego, CA 92126.

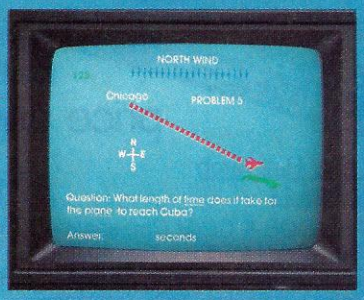
NOW, QUALITY EDUCATIONAL SOFTWARE IS AVAILABLE FOR YOUR HOME COMPUTER.

- PLATO® software now available on disks in Math, Physics, Foreign Languages, Computer Literacy—and more is on the way.
- For use on your Apple II Plus, TI 99/4A or Atari 800.
- Introductory Offering: Single lesson, $45.00; additional lessons, $35.00 each. 10-day money-back trial.

CHOOSE THE LESSONS THAT FIT YOUR CHILD'S NEEDS.



- **Basic Number Facts:** lets your child practice basic numbers, including addition without carrying, subtraction without borrowing and multiplication/division with single digits. Kids race against time to build up their speed in these math areas. Designed for elementary school age, or any child who needs practice with basic whole number operations.
- **Whole Numbers:** simulates a pinball game to hold and build interest in whole number operations. Problems include addition, subtraction, multiplication, division and mixed numbers. Designed for elementary and junior high age groups.
- **Decimals:** kids are challenged to break balloons by entering the correct decimal corresponding to the position of the balloon on a vertical line. Numbers are entered on a trial-and-error basis. Software automatically adjusts difficulty to the child's performance. For elementary math students.
- **Fractions:** same format as Decimals, but requires the use of fractions to break the balloons. Numbers are entered on a trial-and-error basis. Balloons may burst in any order until none are left. Difficulty adjusts to your child's performance. For elementary math students.
- **Computer Literacy—Introduction:** this lesson is presented in a friendly, non-intimidating manner with touches of humor and simple, supportive graphics. It presents the history and uses of computers in today's society. Designed for junior or senior high and vocational school students.
- **French Vocabulary Builder.**
- **Spanish Vocabulary Builder.**
- **German Vocabulary Builder:** students are presented with a basic vocabulary of 500 words, including useful verbs, number words or common words for traveling or in the home. Groups of related words give learners context and similarity clues, which help increase foreign language skills. Lessons supplement introductory and/or refresher coursework.
- **Physics—Elementary Mechanics:** provides a problem-solving test in the elementary mechanics of physics. Students are shown a physical problem; then must "purchase" the missing information needed to answer it correctly. The emphasis is on *understanding* the problem, rather than just supplying the correct answers. Designed for senior high age level.



CONTROL DATA

PLATO

COMPUTER-BASED EDUCATION

CIRCLE 149 ON READER SERVICE CARD

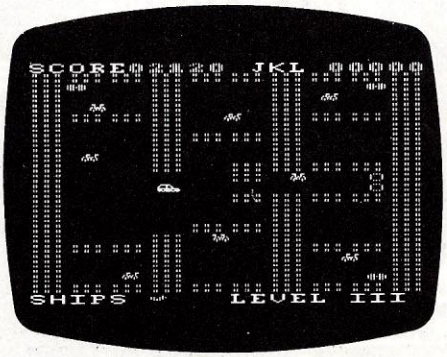
them, but the entire surface is not covered with barriers.

The barriers form garages (or pens) around treasures and deadly Mars Cars. Your challenge is to head out into this land of barriers and Mars Cars, retrieve the four treasures in the corners of each of the 16 boards, and head for the exit (which is actually the entrance to the next level).

On the lower levels, the Mars Cars simply bounce around within their pens and follow predictable patterns around which you can generally manuever. However, on the higher levels, the cars become more intelligent and seem to pick up your scent as they close in for the kill.

You score 10 points for each barrier you destroy and 100 points for each treasure. While it is quite easy to destroy many barriers for big scores, this has the peril of releasing more Mars Cars than you may be prepared to deal with.

Once you have all four treasures on a level, you must head for the exit gate at the center of the right side of the screen to reach the next level. There you will find more treasure, more barriers, and more "devious" Mars Cars.



Although I tried every trick in the book in this Martian demolition derby, the highest I ever got was the 11th level. But wait until tomorrow; I'll make it to level 16 yet.—*DHA*

creative computing
SOFTWARE PROFILE

Name: Mars Cars
Type: Arcade Game
Author: David Husch
System: 48K Apple, disk drive joystick recommended
Format: Disk
Summary: Martian demolition derby
Price: $29.95
Manufacturer:
Datamost, Inc.
9748 Cozycroft Ave.
Chatsworth, CA 91311

Marauder

In Level I of *Marauder* (the first game), you are the pilot of a ship attacking an alien planet and its defense installations. The first line of defense is an energy shield which covers the surface of the planet. You can maneuver your small craft around the screen using a joystick (or keyboard if your fingers are more coordinated than mine).

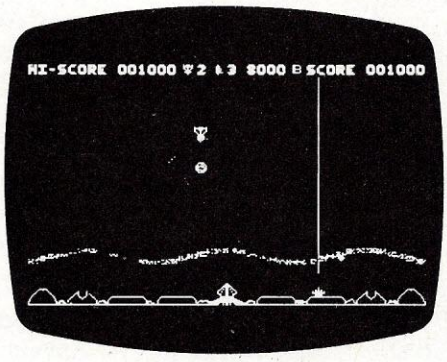
Your weapon always points down and is fired with Button 1. Button O gives an added burst of speed to avoid enemy fire.

creative computing
SOFTWARE PROFILE

Name: Marauder
Type: Arcade Game
Authors: Rorke Weingandt and Eric Hammond
System: 48K Apple, disk drive, joystick
Format: Disk
Summary: Invade the alien homeland; two games
Price: $34.95
Manufacturer:
Sierra On-Line
36575 Mudge Ranch Rd.
Coursegold, CA 93614

This should be used sparingly since there is a four-second interval between permissible uses of that function. You must destroy seven defense installations (nine at higher levels of play) before you fly into the ruins of the fireball launcher and enter the labyrinth of the city.

Needless to say, these defense installations are not just sitting still waiting for



It's Here! 2 for 1 sale

Buy one of our computers at our usual discounted price and get the new ***Timex-Sinclair*** Computer ***Free.***

LNW Research
Model 11 ..... **$2499**
TRS-DOS & CP/M Cmpatible—Green Phosphor Monitor—Two 40 Trk. Drives—96K—4 Mhz. Speed—Hi Res & Color Graphics—RGB Interface—Fan—6 Month Warranty

Custom Radio Shack
Model 111 ..... **$1899**
—Dual 40 Trk. Drives—48K RAM—180 Day Warranty
Options: CP/M—64K RAM

Sanyo MBC-1000 ..... **$1899**
"Affordable High Performance Computer"
40 Trk. Double Sided Disk Drive—64K—4Mhz Speed—CP/M—Basic Language—Detachable Keyboard

Other Drive Configurations Available

Software: MicroPro • Microsoft • Ashton-Tate • Sorcim • LifeBoat
Printers: Epson • Okidata • C. Itoh • Smith Corona • Comrex
Specialty Items: LNW Expansion Interface & Doublers Disk Drives • TRS-80 Mod III Drive Kits • Printer & Drive Cables

Timex-Sinclair **$89.95**
Atari 400, Atari 800 ..... **$call**
Lobo Max 80 ..... **$call**

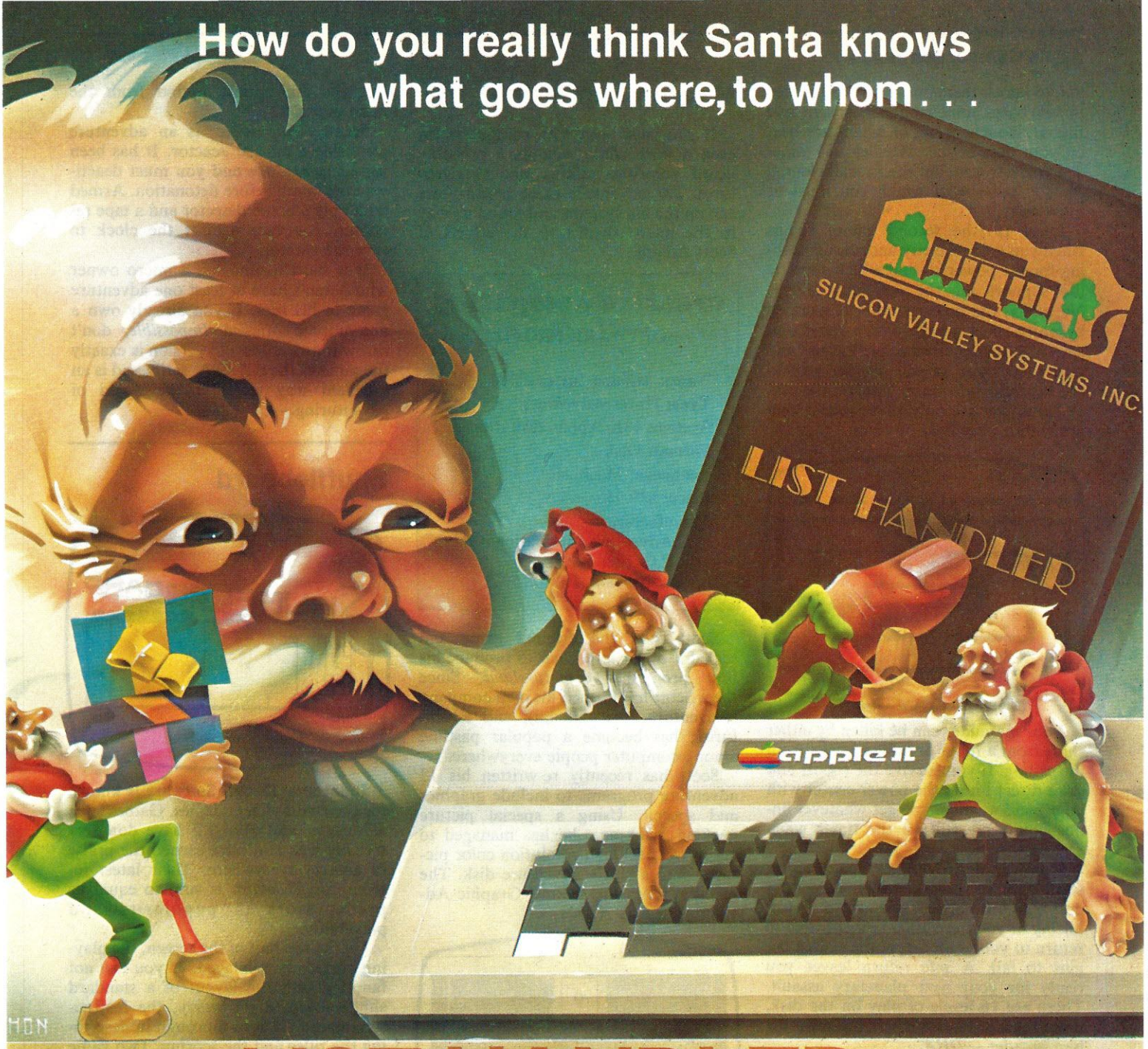
Freedom Technology Int'l
CP/M Conversion Boards for TRS-80
Freedom Option ... $199 • Freedom Plus (adds 16K) ... $399

Visa, Mastercard, Personal checks accepted. This is a limited time offer.

MERIDIAN
119 N. 18th Street Phila., PA 19103
(215)-569-2420

Trademarks: TRS-DOS, TRS-80, Radio Shack–Tandy Corp., CP/M-Digital Research Corp.

CIRCLE 201 ON READER SERVICE CARD



LIST HANDLER

The List Handler is, **without doubt**, much more than a mailmerge program.

Presto! List Handler turns your Apple® into a quick response file cabinet with room to grow storage space.

With List Handler you can hold up to 3000 records per drive so that 24000 can be kept on-line at the same time with multiple disk drives.

These records can be addresses if you choose, but here's where the versatility and flexibility come in.

Put what you like on those records!

- inventory
- product lists
- form letters
- short newsletters
- mailing lists
- personnel directories
- invoices
- labels

The list is endless.

The List Handler will run on one or more drives, read and write DIF format and has unlimited sort fields.

List Handler can stand alone or as an interface with your Word Handler (or most other word processors) for the most efficient word processing duo around.

The List Handler will surprise you, but the first surprise will be the price! At **89.95** the List Handler is the best and the only buy of its type around.

The enormity of Santa's job may have you skeptical of Santa's existence—but when you see the List Handler you might just believe in Santa again! See your Apple dealer for the List Handler.

Apple is a registered trademark of APPLE COMPUTER, INC.

Simply the best . . .

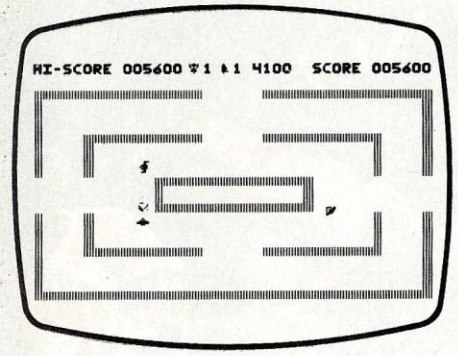
Silicon Valley Systems

Silicon Valley Systems Inc. 1625 El Camino Real #4 Belmont, CA 94002 415-593-4344

CIRCLE 255 ON READER SERVICE CARD

you to knock them out. There are guided missile bases, mine launchers, lasers, and fireball launchers, all of which are bent on your destruction. Missiles and mines can be destroyed, but the fireball cannot, so it is the one of which you must be most wary.

Level II (the second game) begins when you enter the city and start searching for the power station which supplies life support for the defending aliens. Naturally, the power station is guarded by nasty robot guards which communicate with one another as well as see and hear your shots as you wander around the Berzerk-style maze. You, on the other hand, can see only those robots that are within your field of vision.



Your marauder can be killed by either shots from a robot or falling bricks from the ceiling. If you survive the robots and get a direct hit on the power center with your hand weapon, you get whatever bonus points are still on the timer when you destroy it.

However, destroying the power center starts a chain reaction which eventually destroys the entire alien world. After hitting it, you have 2000 units of time to return to your ship before the ceiling begins to fall. A safe return leaves you ready for your next planetary assault. There are 16 levels of play on the disk, more than enough to challenge even the best arcader.—*DHA*

"Just leave your name...we'll call you when the need arises for a video-games champion..."

Mission Impossible

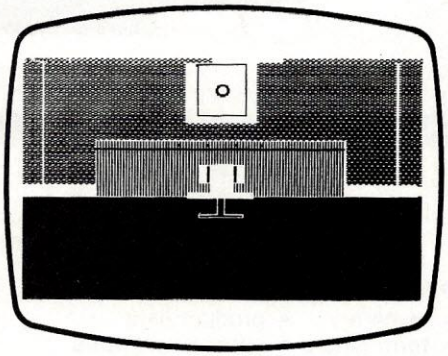
If you have been with computers for even a little while, you have probably heard someone talking about adventures. The adventure game began years ago on the big systems and found its way to the micro thanks to the efforts of Scott Adams.

creative computing
SOFTWARE PROFILE

Name: Mission Impossible
Type: Hi-res Adventure
System: 48K Apple, disk drive
Format: Disk
Language: Machine
Price: $29.95
Manufacturer:
Adventure International Inc.
P.O. Box 3435
Longwood, FL 32750

Scott took the original game and scaled it down somewhat to produce his first program, *Adventureland*. Since then, Scott has formed his own company (Adventure International), and adventuring has become a popular pastime among computer people everywhere.

Scott has recently re-written his 13 adventure programs to include graphics and speech. Using a special picture packing technique, he has managed to cram over 100 high-resolution color pictures onto a single adventure disk. The result is the Scott Adams' Graphic Adventure (S.A.G.A.) series.

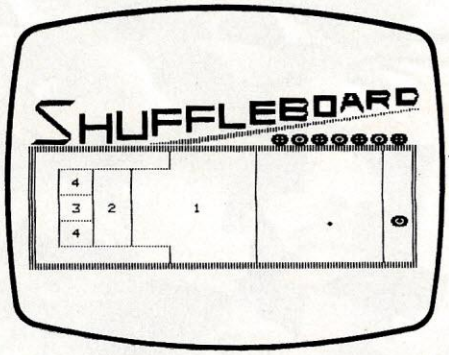


Although the graphics are spectacular, the real fun is listening to the speech. If you have a Votrax Type-N-Talk unit, you can specify speech output at the beginning of the game and enjoy audible prompts throughout the game. Don't worry if you don't own a Votrax, however. The program will run fine without it. A complete menu allows you to customize the game to suit your mood. If you don't want the pictures, or you feel like playing without the speech, you just select the appropriate option from the main menu.

Mission Impossible is an adventure set inside a nuclear reactor. It has been rigged to explode and you must deactivate the bomb before detonation. Armed with only a bomb detector and a tape recorder, you race against the clock to save the reactor.

It is hard to imagine a micro owner who doesn't have at least one adventure game in his files. If you already own a non-graphic *Mission Impossible*, don't throw it away. The old version is exactly the same as the S.A.G.A. series and is an excellent way to enter the world of adventuring.—*CV*

Shuffleboard



Innovative Design Software is known for their non-violent games. Games such as *Juggler* and *Pool 1.5* have done extremely well and have earned the praise of gamers everywhere. Their latest release, *Shuffleboard,* is sure to equal its predecessors in popularity and playability.

On the top half of the screen, the playing surface is displayed. If you are not familiar with the layout of a standard shuffleboard, don't worry, the instruction manual is very thorough in describing the rules and the scoring. Two game options, "Tally All" and "Cutthroat" are available.

creative computing
SOFTWARE PROFILE

Name: Shuffleboard
Type: Simulation
System: 48K Apple, disk drive
Format: Disk
Language: Machine
Price: $29.95
Manufacturer:
IDSI Inc.
P.O. Box 1658
Las Cruces, NM 88004

"When I need words . . . I use The WORD HANDLER"

It speaks for itself!

The Word Handler is the easiest word processor around. . .also the most sophisticated. The Word Handler is a single-key command word processing program that runs without hardware modifications to your Apple®, or Apple compatible computer.

Words can't describe how much I love the Word Handler but let me tell you the Word Handler gives me unlimited tabs, incremental spacing, vertical spacing and a two character format. My Word Handler comes with a simple-to-understand manual, complete customer service and free, yes, **free** upgrades.

The Word Handler's many print features are displayed on the screen so I can see at a glance exactly what will be printed. For example: underlining, **bold** super^{script}, UPPER / lower case. Even / normal justification.

See your Apple, or Apple compatible computer dealer for sophisticated simplicity... The Word Handler.

Let it speak for you.

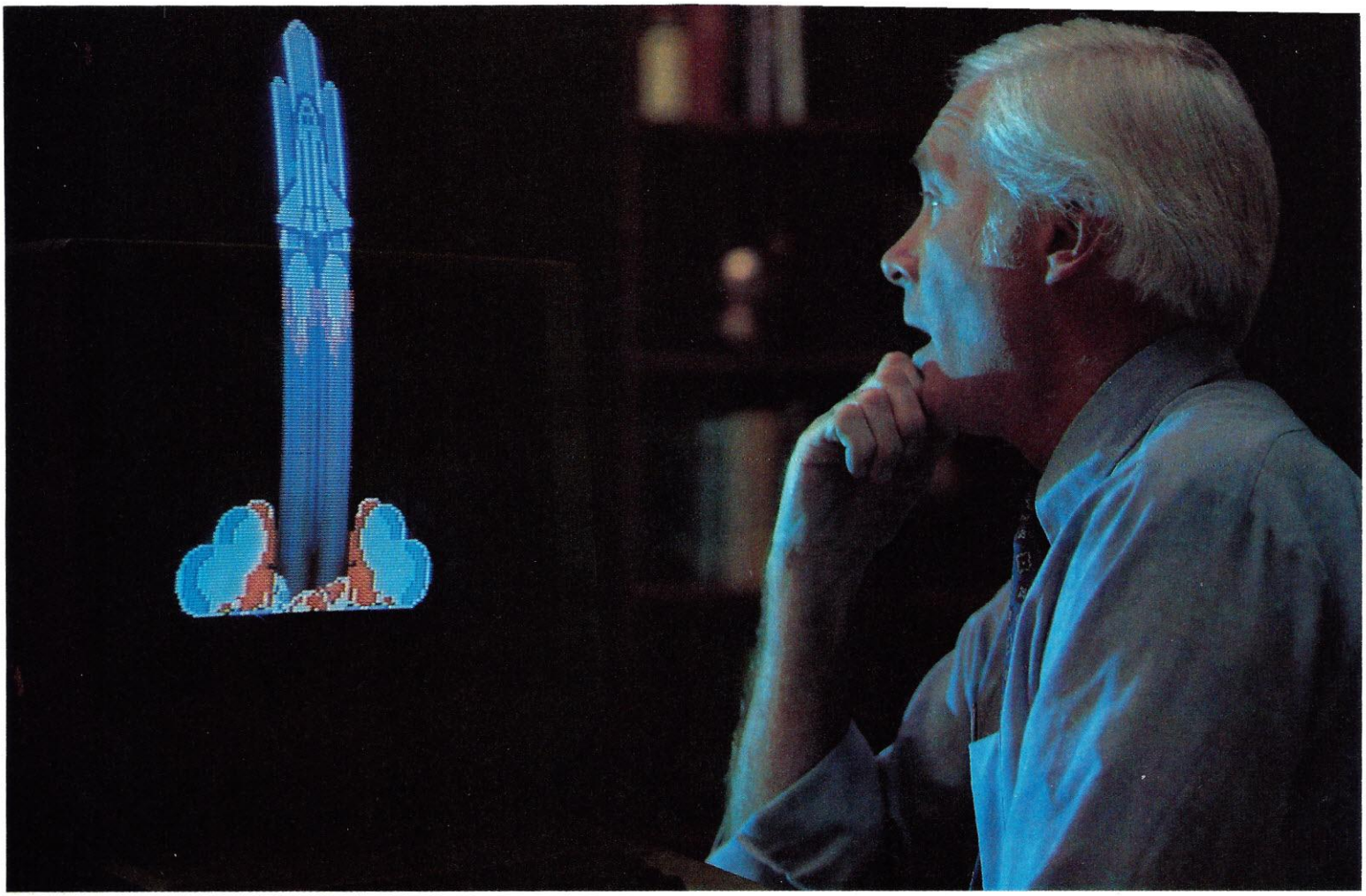
Apple is a registered trademark, of APPLE COMPUTER, INC.

Simply the best . . .

Silicon Valley Systems

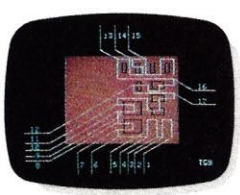
Silicon Valley Systems Inc. 1625 El Camino Real #4 Belmont, CA 94002 415-593-4344

CIRCLE 256 ON READER SERVICE CARD



THE GRAPHIC SOLUTION

Solve your toughest communication problems with the Graphic Solution™, a sophisticated, new graphics package from Accent Software.



With precise, multi-speed ANIMATION create captivating sales presentations and product demonstrations that will both intrigue and inform your clients and customers. Watch their reactions; you'll see your messages getting through.

Develop educational materials and training aids that MIX TEXT AND GRAPHICS on the screen, breathing new life into abstract, hard-to-grasp concepts. Mix programs too. Images can be displayed on backgrounds loaded from any of your other programs. Construct custom TYPEFACES AND TYPESIZES to balance the visual elements.

Tired of run-of-the-mill business graphics? Change standard charts and graphs into colorful THREE DIMENSIONAL PERSPECTIVES. Add text and animate the data to show the relative rates of change for your most important information. Like cash flow projections. Or revenue estimates.

Plot flowcharts, time and motion studies, industrial process flows with COLOR-CODED ELEMENTS highlighting critical paths. Animate the sequences to show how flows actually progress.

Work with live action? Prepare film and videotape storyboards using the unique FRAME-BY-FRAME graphic sequencer that lets you create and animate a video story before shooting.

Whatever your graphic communication demands—in the business world, the arts, industry, education—The Graphic Solution™ at $149.95 has the answer. Take a hard look at The Graphic Solution. You'll like what you see.

The Graphic Solution requires a 48K Apple II with ROM Applesoft and DOS 3.3.

See your local dealer or send $10.00 for a demonstration diskette to:

ACCENT SOFTWARE, INC.

3750 Wright Place, Palo Alto, Calif. 94306 Telephone 415-856-6505

Apple is a registered trademark of Apple Computer, Inc.

Aiming the puck is accomplished with the U and D keys. All you have to do is line up the puck and the aimer. After you select the force with which you will push the puck, the S key sends it sliding down the floor.

If you can't find anyone around who wants to play a game, *Shuffleboard* has a computer play mode which is always ready to go. While playing against the Apple, we were surprised at the fairness of the program. Sometimes, computer routines cheat by making moves too accurate for humans to reproduce. Not so with *Shuffleboard*. The computer is challenging player, but not impossible to beat.

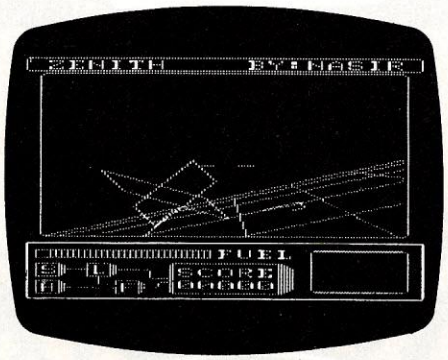
Shuffleboard is a pleasant computer adaption of a classic game. Whether you are a shuffleboard fan or not, this package is worthy addition to any software library.—*CV*

Zenith

Zenith is a 3-D action game in which you must defend a helpless space colony from alien attack. These aliens just don't want any humans to occupy their galaxy. In fact, they are ready to destroy anything that you may try to build. To rid yourself of these troublemaking creatures, you must blast their ships with your lasers and then capture the alien pilots with your rescue claw.

So far it sounds pretty much like any other game. However, why would anyone want to capture the aliens? Why not let them die out in space? Well, it turns out that the aliens are necessary for your survival. During play, fuel, shield, and laser energy are consumed by your ship. The only way that you can replenish your supplies is by purchasing them from the aliens' base ship. The currency is, of course, your alien hostages.

After you gather four aliens in your collection chamber, your ship is automatically drawn to their base and your cargo is exchanged for fuel. It sounds easy, but catching the alien astronauts is extremely difficult.



In addition to the task of retrieving the spacemen, there is a time limit involved in play. If you do not bring your hostages back to their base soon enough, they begin to suffocate, and will die in minutes.

The entire battle takes place over an animated 3-D grid. As you are turning, diving, and climbing, the ground pattern changes to give you the feel of flight. Even our best programmers were amazed at the animation techniques employed in *Zenith*.

In summary, *Zenith* is a well executed game that is sure to amuse everyone. The graphics are excellent, and the idea is new. *Zenith* gets our highest rating.—*CV* □

creative computing
SOFTWARE PROFILE

Name: Zenith
Type: Arcade
Author: Nasir Gebelli
System: 48K Apple, disk drive, joystick optional
Format: Disk
Language: Machine
Summary: Excellent 3-D graphics
Price: $34.95
Manufacturer:
Gebelli Software Inc.
1771 Tribute Rd., Suite A
Sacramento, CA 95816

JANUS ADA

Question: When can I use Ada?

Answer: NOW — with JANUS.

The language that is based on the past but looks to the uses of the future.

Ada is available now for your micro-computer.
JANUS is a subset of Ada which includes those features sorely missed by programmers on micros. Here is a list to help you decide for yourself.

+ Modular Separate Compilation
+ Single and Double Precision Floating Point Numbers
+ Binary Coded Decimal (BCD) Fixed Point Numbers
+ Integer and Long Integer Numbers
+ Complete String Handling
+ Sequential and Random Access I/O
+ Full Dynamic Allocation and Deallocation
+ Friendly Error Handling
+ An Assembler for interfacing assembly routines
+ A Linker for combining modules
+ True native code is produced
+ ROMable, reenterant code
+ Run-time library source code
+ Low Cost. **JANUS** is more cost effective than any other comparable Ada package
+ Inexpensive Updates
+ No royalties for programs written in **JANUS**
+ No hassle customer service

In short, all pluses. **JANUS** contains everything you need to do fast, structured program development in a micro environment.

JANUS is available for the CP/M, CP/M-86, and MS-DOS operating systems.

Now you too can take a step forward into the future on these computers:

8080/Z80 based systems: (All CP/M) Apple Softcard, North Star, Cromemco, Superbrain, TRS-80 Model II, and all CP/M 8" disk systems.

8086 based systems: IBM Personal Computer, Victor 9000, Seattle Computer System II, Tecmar, Lomas Data Products, and all CP/M 8" disk systems.

8080 or Z80, CP/M (requires 56K memory) — $300.00

8086/8088, CP/M-86 or MS-DOS (requires 96K memory) — $400.00

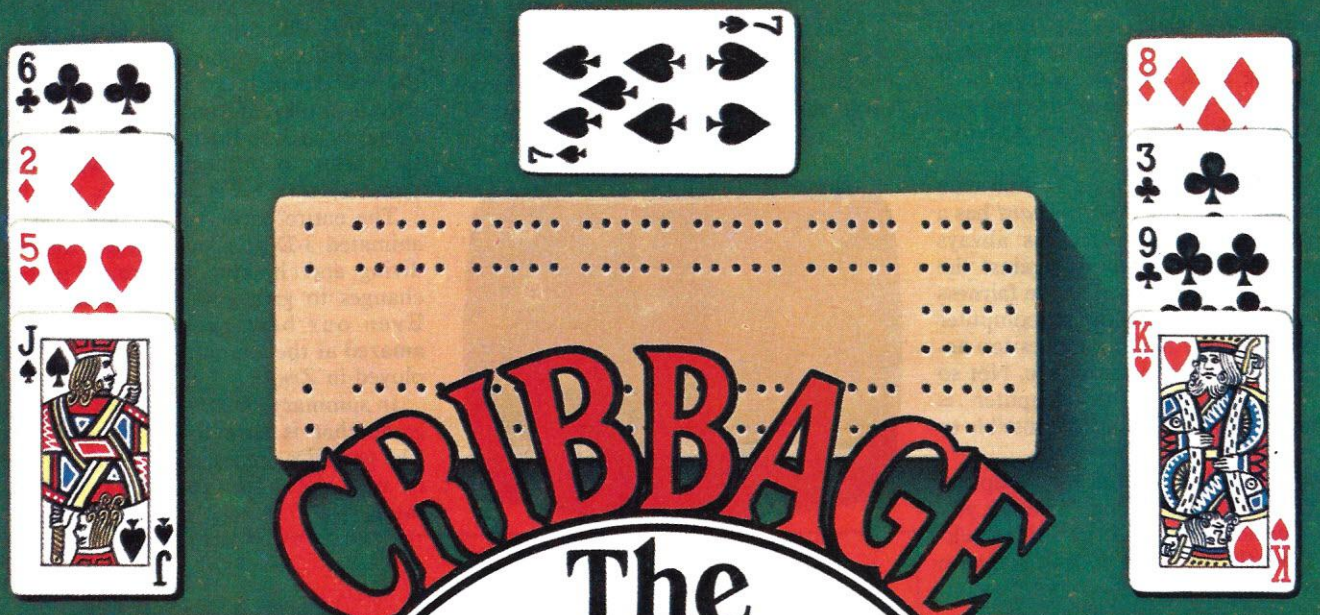
CP/M, CP/M-86, MP/M-86 are trademarks of Digital Research, Inc.
* ADA is a trademark of the U.S. Department of Defense
MS-DOS is a trademark of Microsoft

86-DOS is a trademark of Seattle Computer Products
SB-86 is a trademark of Lifeboat Associates
Apple Softcard is a trademark of Microsoft, Inc.
©Copyright 1982 RR Software

RR SOFTWARE
specialists in state of the art programming
P.O. BOX 1512 MADISON, WISCONSIN 53701 (608) 244-6436

CIRCLE 245 ON READER SERVICE CARD

By the Cardmaster—original Cribbage and 4 Solitaire games!



CRIBBAGE

The Card Stars

SOLITAIRE

When you're tired, upset, bored . . . in need of a challenge, or just relief from the ordinary there's nothing to compare with the fun and involvement of Solitaire or Cribbage. Within seconds you've forgotton the world and are absorbed in the play of the cards. And the brilliant way the Cardmaster programmed these games has taken out the effort and distractions but left in all the fun and challenge.

On a scale of 1 to 10. these card stars rate a big 11! . . . for sheer enjoyment and unmatched value. Think of it, five of the Cardmaster's best games at the price you'd expect to pay for just one! It includes original Cribbage, with your strategy against the Apple . . . plus 4 Solitaire games: Klondike, the all time standard, in 2 versions (1 or 3 cards at a time), exciting Picture Frame and the challenging Pyramid! If you or your family like cards at all, this is the one disk you must get!

Only $34.95 for the Apple II* at your computer store or:

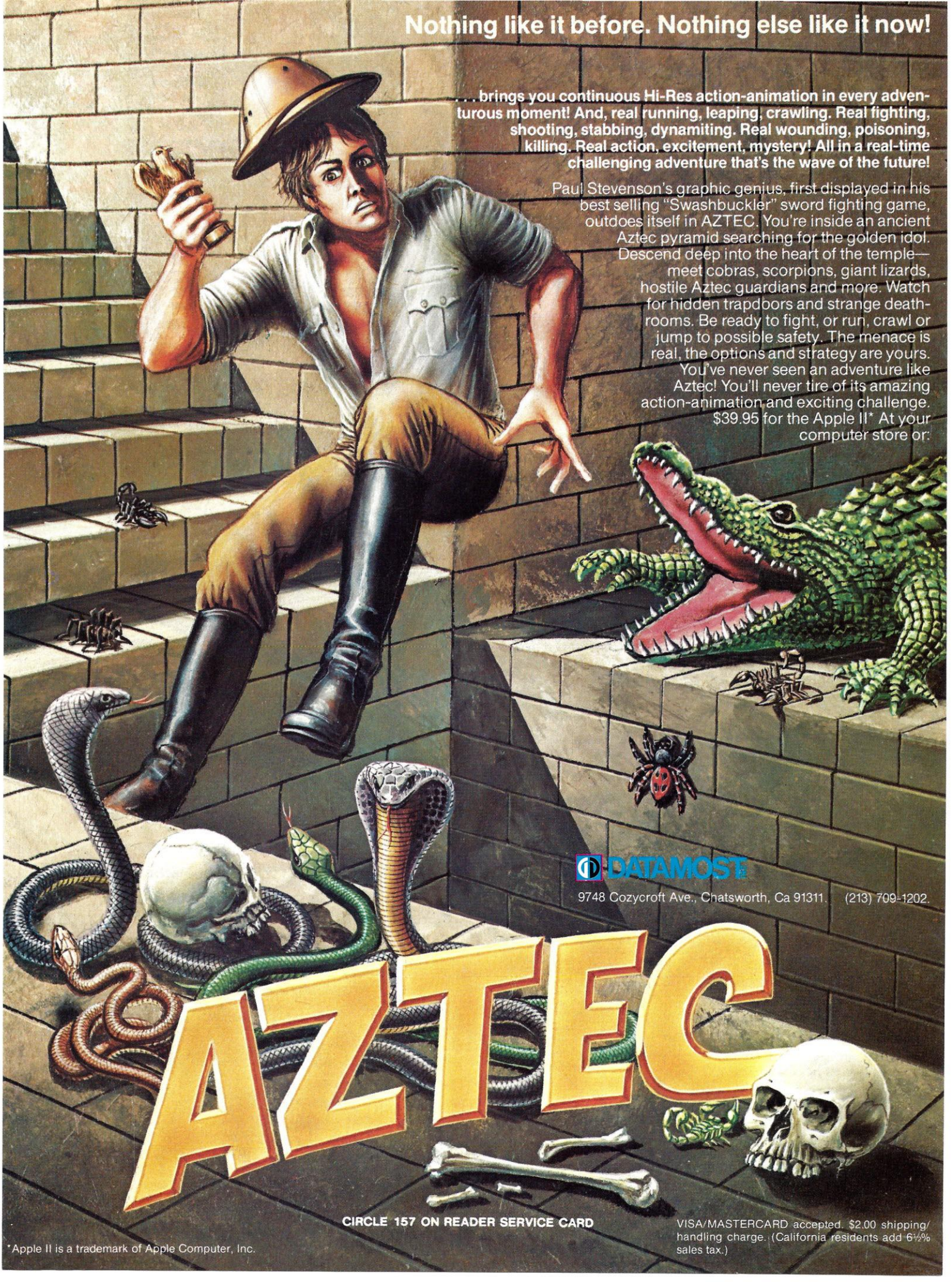
DATAMOST INC

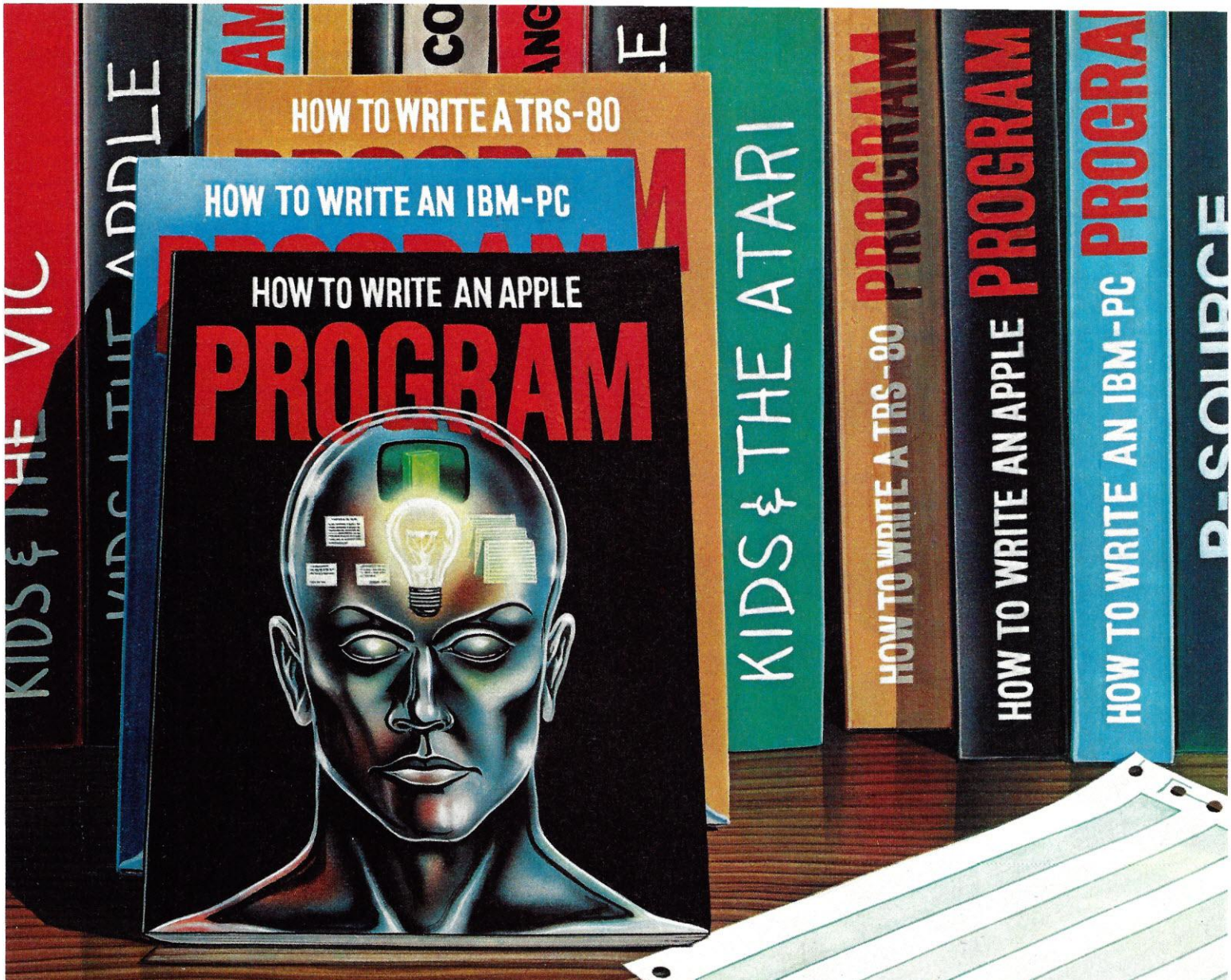
CIRCLE 156 ON READER SERVICE CARD

9748 Cozycroft Ave., Chatsworth, CA 91311 (213) 709-1202.

VISA/MASTERCARD accepted. $2.00 shipping/handling charge. (California residents add 6 ½% sales tax.)

*Apple II is a trademark of Apple Computer, Inc.


Nothing like it before. Nothing else like it now!
. . . brings you continuous Hi-Res action-animation in every adventurous moment! And, real running, leaping, crawling. Real fighting, shooting, stabbing, dynamiting. Real wounding, poisoning, killing. Real action, excitement, mystery! All in a real-time challenging adventure that's the wave of the future!
Paul Stevenson's graphic genius, first displayed in his best selling "Swashbuckler" sword fighting game, outdoes itself in AZTEC. You're inside an ancient Aztec pyramid searching for the golden idol. Descend deep into the heart of the temple—meet cobras, scorpions, giant lizards, hostile Aztec guardians and more. Watch for hidden trapdoors and strange death-rooms. Be ready to fight, or run, crawl or jump to possible safety. The menace is real, the options and strategy are yours. You've never seen an adventure like Aztec! You'll never tire of its amazing action-animation and exciting challenge. $39.95 for the Apple II* At your computer store or:
DATAMOST
9748 Cozycroft Ave., Chatsworth, Ca 91311 (213) 709-1202.
AZTEC
CIRCLE 157 ON READER SERVICE CARD
VISA/MASTERCARD accepted. $2.00 shipping/handling charge. (California residents add 6½% sales tax.)
*Apple II is a trademark of Apple Computer, Inc.



3 exceptional books join the DATAMOST library.

INTRODUCING . . .
HOW TO WRITE A PROGRAM

Here is a series of easy to read, easy to use, easy to understand books, which teach you how to write usable, useful programs on your computer. And you don't have to worry about irrelevant material which has no interest for you, because there are three specific volumes. One for the Apple,* one for the IBM-PC,* and one for the TRS-80.*

In each of these books author Ed Faulk leads you through your favorite computer and takes the mystery out of writing programs for it. As you proceed, interesting chapter by interesting chapter, you'll wonder why you were ever intimidated by the thought of programming!

If you want to get the very most out of your Apple, IBM-PC or TRS-80 then you really want HOW TO WRITE A PROGRAM. Before you're past Chapter 2 you'll be programming. By the end of the book you'll be willing to tackle business programs, personal use programs and even games and adventures! **$14.95**

Get your copy now. Available at computer and book stores, or:

DATAMOST (213) 709-1202
9748 Cozycroft Ave., Chatsworth, CA 91311

Reston Publishing Company, Inc.
A Prentice-Hall Company
Reston, Virginia
Toll free (800) 336-0338

*Apple is a trademark of Apple Computer, Inc./IBM-PC is a trademark of IBM Corp./TRS-80 is a trademark of Tandy Corp.
VISA/MASTERCHARGE accepted. $2.00 shipping/handling charge. (California residents add 6½% sales tax.)

CIRCLE 170 ON READER SERVICE CARD

The arcade-warp is open!

YOU CAN RUN BUT CAN'T HIDE. YOU CAN KILL BUT CAN'T ESCAPE.

Tubeway! It's an insidious invasion route created by beings from a parallel universe—a strange, geometric universe. You're trapped on the rim as their fleet swarms out of the warp on a voyage of conquest. The battle is yours alone—and it's far from easy because normal strategy doesn't work! . . . you have to fight by their strange, geometric rules!

Here's the fastest, most fascinating of the new style space games. So involving and exciting it's destined to become an all-star, all-time hit. Be one of the first to take on the challenge of the lightfast Tubeway!

$34.95 for the Apple II*. At your computer store or:

TUBEWAY

DATAMOST Inc.

9748 Cozycroft Ave., Chatsworth, CA 91311
(213) 709-1202

VISA/MASTERCARD accepted. $2.00 shipping/handling charge. (California residents add 6½% sales tax.)

Apple II is a trademark of Apple Computer, Inc.

CIRCLE 158 ON READER SERVICE CARD

COREY WOLFE

creative computing software evaluation

An Adventure Game for the Apple II With (Almost) Everything

Robert Plamondon

What would you expect from the ideal adventure game? A good plot, of course. A game that gives you many options would be nice — too many games practically play themselves. Excitement (maybe combat) is important, too. Perhaps a series of adventures would be more fun than just one. And, of course, the game should be without obvious flaws.

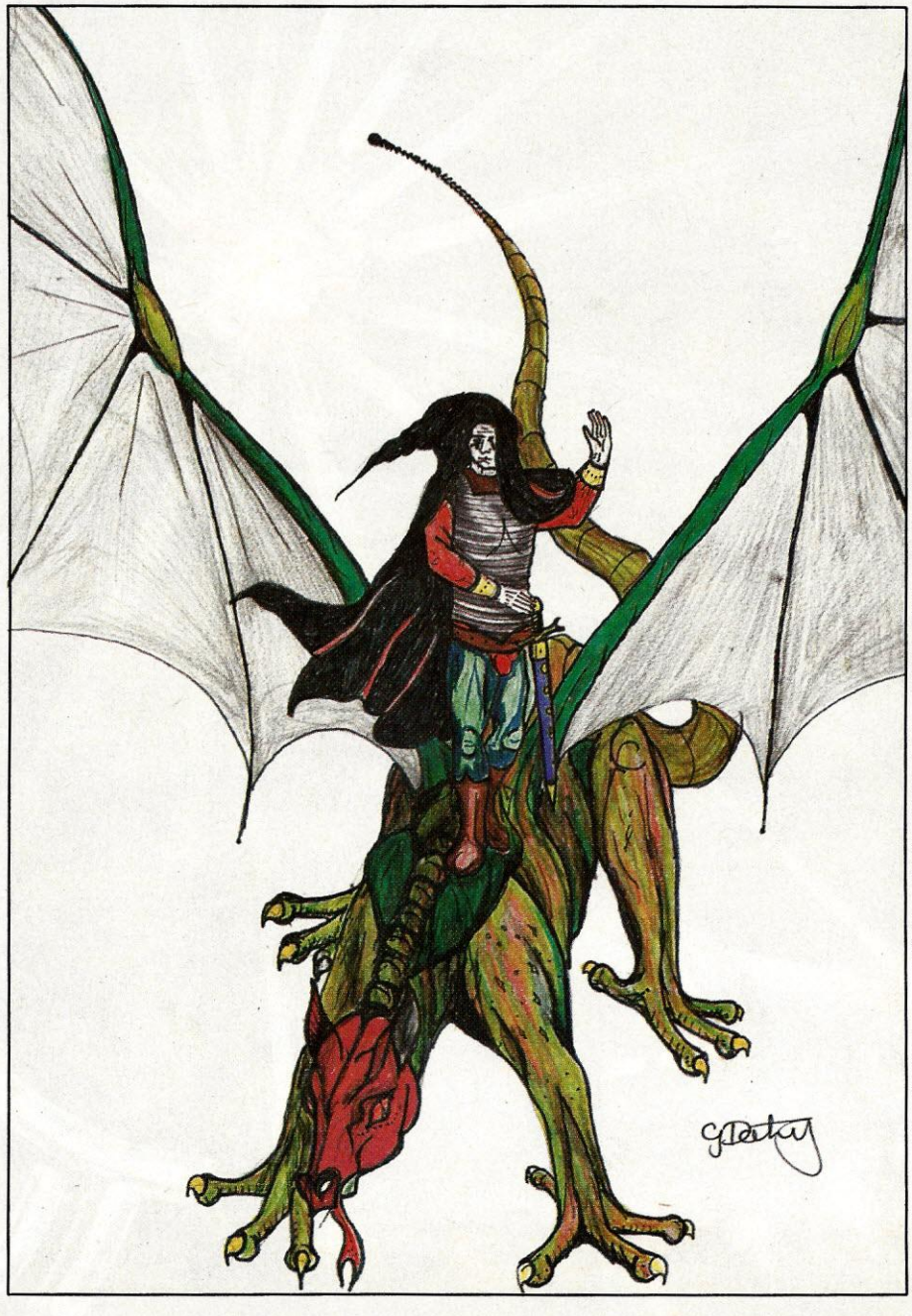
Many games meet these criteria, but very few are available for less than $5 per adventure. And only one is designed to allow you to write your own adventures without actually doing any programming. This game is called *The Wonderful World of Eamon*.

Description

Eamon is an all text adventure game, revolving around the activities of a make believe character in a make believe setting.The Computer describes the setting, and the player controls his character with two-word commands, such as GET TREASURE, or FREE PRINCESS. The adventure is usually a quest: the character must recover something, such as a kidnapped princess or a cure for the Black Plague.

Unlike most adventure games, the difficulty in succeeding in the quest is caused by unfriendly creatures, not by a series of riddles. The problem lies in reaching the goal before being hacked to pieces, not in trying to puzzle out a series of ambiguous clues. This makes *Eamon* more exciting than many adventure games.

Robert Plamondon, 667 SW 15th Street, Corvallis, OR 97333.



Illustrations by Gerald Doherty, 454 New Bedford Rd., Luton, Bedfordshire, England.

Eamon has a Master Diskette which contains the programs for creating characters, buying goods, and so on. It also contains a short adventure, called The Beginners' Cave. To the best of my knowledge, *Eamon* is available only for the Apple II, but it could be adapted to other computers, since it is written entirely in Basic.

Playing Eamon

When you boot up the Master Disk, you are asked for your character's name. The program searches through the list of your old characters. If it finds an old character with the same name, it reads in that character's statistics and sends you to the next program; the Main Hall.

If it doesn't find a character, it assumes you want to create a new one and rolls up some statistics. Characters have three major attributes: hardiness, agility, and charisma.

Hardiness is a measure of the character's strength and his ability to take punishment. Agility is related to his ability to hit what he is aiming at. Charisma is the ability to deal amicably with other creatures.

The Main Hall program allows you to purchase weapons, armor, and spells, and to sell the loot obtained on adventures. New characters start with a small amount of money — enough to buy second-rate armor, a weapon, and maybe a weak spell. After browsing through the Main Hall, the character is ready for an adventure.

Adventures

There are 25 *Eamon* adventures available now, and several more in various stages of completion. The adventures vary enormously in style, the wide variety being one of the best features of the game.

Unfortunately, they vary in quality, as well — but the best adventures are *very* good, and all of them are *very* cheap, so you don't waste much money if you happen to choose a poor one.

When you are ready to go on an adventure, the Main Hall program will tell you to put the adventure disk in the drive and hit the C key to begin your adventure.

The adventure usually starts with a description of what is going on. A typical situation is that some villain has done something unspeakable, and has kidnapped a princess as well. Your job is to kill the villain, undo the evil deed, and rescue the princess. (This scenario is amazingly durable; it appears not only in the usual fantasy settings, but in adventures such as The Death Star, as well.)

After informing you of your plight, the disk spends a minute or so reading in the Base Dungeon Program and data for the adventure. After the computer has digested a few thousand bytes of data, the adventure begins.

Most features of *Eamon* will be familiar to adventure gamers: There are unknown areas to explore, treasures to be found, and problems to solve. Most *Eamon* adventures lack a save game feature, which makes it impossible to quit in the middle without consigning your character to oblivion. On the other hand, it avoids one problem of the other games, in which you can save the game as insurance — by saving the game every five minutes, you can undo a character's death by loading in the saved game.

A typical situation is that some villain has done something unspeakable, and has kidnapped a princess as well.

This tends to make the adventure a test of game-saving strategy, rather than a test of skill in the game itself. In *Eamon*, when a character dies, he stays dead. This makes adventuring a lot riskier, but risk makes the game more exciting.

Critters and Combat

While most of *Eamon* is similar to traditional adventure games, it has two unusual features: the ability to make friends during the adventure, and a complete combat system.

Creatures in *Eamon* come in all shapes and sizes. Some are friendly, some are hostile, and some can be either, depending on the character's charisma and luck.

Interaction with other creatures is rudimentary: if a critter likes you, it follows you around and helps fight your enemies. If it dislikes you, it attacks you. If it is neutral, it ignores you, and refuses to attack either your friends or your enemies.

Gifts can influence a creature's reaction to a character. Giving out gold can sometimes make a hostile creature friendly. Giving a friendly creature junk to carry may make it hostile. A character of mine once gave a destroyed 'droid to the Wookie in the Death Star adventure. The Wookie displayed his resentment at being used as a pack animal by killing my character.

Combat is a major ingredient of these adventures. *Eamon* was designed with fantasy role-playing games in mind, and has an excellent combat system.

When one creature tries to hit another, its ability to hit is equal to its weapon skill minus the dodging skill of the target. The amount of damage done by a blow is determined by the weapon type. Armor absorbs a certain amount of damage per blow; the remainder is subtracted from the defender's hardiness. If the creature's hardiness drops to zero, it dies.

This applies to characters, too; characters die quite often in *Eamon*. Fortunately, these deaths aren't random or arbitrary (as they are in some of the poorer commercial games). Combat is dangerous, and if you fight, your life is in danger. If you pick your fights carefully, you lose fewer characters.

Every time your character uses a weapon or spell successfully, there is a chance that his ability in that skill will increase. This lets your characters learn from experience, and as their skill increases, they can tackle progressively more difficult adventures.

Figure 1 shows part of a game, including combat.

Designing Adventures

One of the special *Eamon* diskettes is the Dungeon Designer Diskette, or DDD, which has a collection of programs to help you create your own adventures.

Eamon is structured so that information about the adventure, such as monster descriptions, room layout, and artifact data, are all stored in disk files. The Base Program uses these data to run the adventure.

This means that all you have to do is write the data files; the adventure progam is already written. The upshot is that *Eamon* adventures can be written without doing any programming at all.

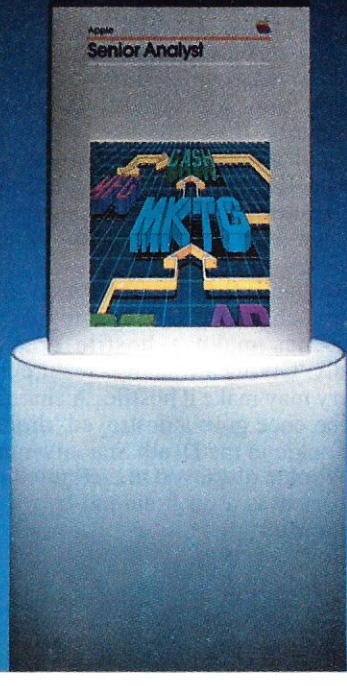
The programs on the DDD prompt the user for input, and have several useful text editing commands, making it easy to input the data for an adventure. The procedure for typing in an adventure is really quite simple; the hard part is coming up with good ideas for adventures.

Recommended Programs

Eamon was developed by Donald Brown for the purpose of putting a computer role-playing games system in the public domain. While most designers are content to design each adventure from scratch, Brown designed an adventure *system*, with programs to help authors create their own adventures.

Since *Eamon* is in the public domain, it is legal, ethical, and fun to make cop-

What if "what if" isn't enough?



Just when the business world is up to its white collars in visiclones, calcalikes and other spreadsheet packages, Apple's® come out with something entirely different.

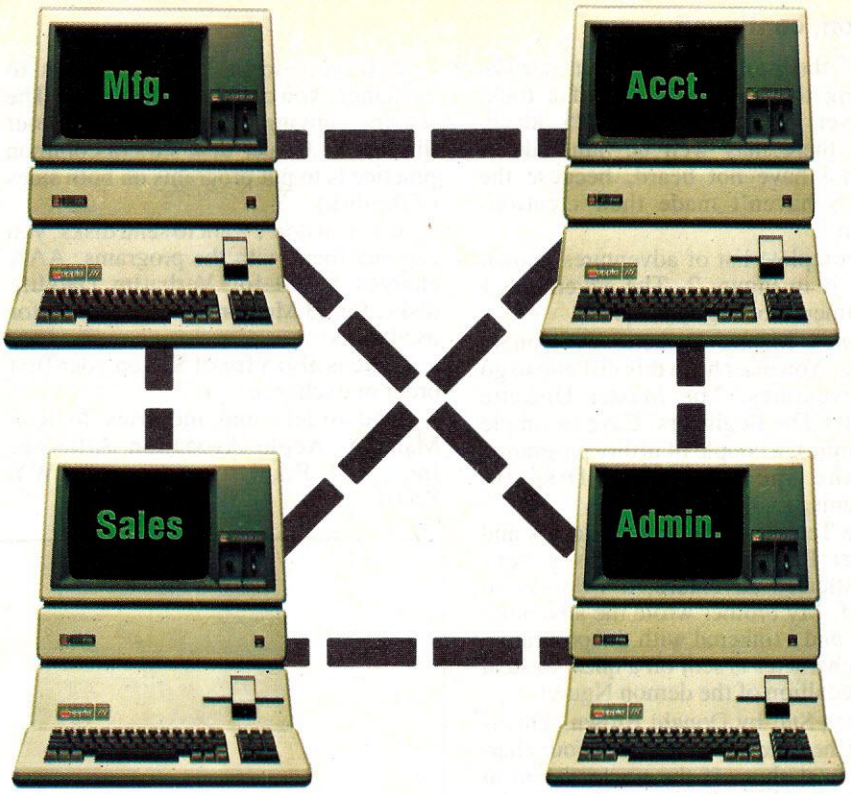
Introducing Senior Analyst.

Like other financial modeling packages, it allows managers and professionals to ask all those proverbial "What If?" questions.

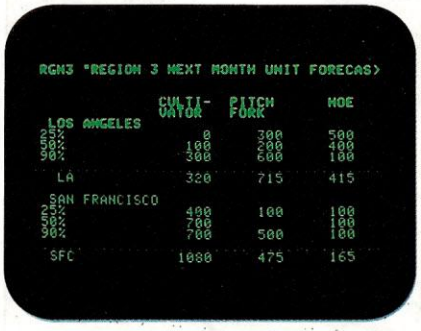
Unlike the others, this powerful financial planning tool was designed to be used in a corporate environment, by lots of people. So you get lots of advantages.

For example, you can transfer data (across diskettes) from one financial model to another. Or consolidate many models into one.

So sales, manufacturing, administration and any number of other departments (even in other cities) can easily share information. Giving each the power to create comprehensive and flexible financial projections, budgets, cash flow statements and the like.



Senior Analyst lets different departments share and consolidate data. That way the company doesn't make more pitchforks than it can sell.



With Senior Analyst, you can now cultivate forecasts by merging reports from distant divisions.

Want to combine selected data (such as important subtotals) from six different divisions? With Senior Analyst, you can do it. And even print out a formatted report that includes only the information you need.

A report that anyone can understand. Because the headings are in English, not in code.

Easy to follow commands allow employees to create models without learning a second language.

You can also document and print out all those assumptions used to create your model, to give others a concrete understanding of how you reached your conclusion. (The program even allows you to continue working while a model is being printed.)

To complement all these accommodating features, you'll also find built-in functions for depreciation, linear regression forecasting, and other powerful virtues not found in most financial software packages.

All of which we'd like you to experience in person, at any of our 1300 authorized full-support dealers (they also offer a vast library of other quality software distributed by Apple for Apples).

And don't ask for just any spreadsheet package. Tell them you need to see an analyst.

apple®

The most personal software.

Call (800) 538-9696 for the location of the authorized Apple dealer nearest you, or for information regarding corporate purchases through our National Account Program. In California (800) 662-9238. Or write Apple Computer Inc., Advertising and Promotion Dept., 20525 Mariani Ave., Cupertino, CA 95014. © 1982 Apple Computer Inc.

CIRCLE 111 ON READER SERVICE CARD

ies of the programs for your friends. Finding them is something of a trick, however. While I know of 25 adventures, there may well be hundreds of which I have not heard, because the authors haven't made their creations known.

A complete list of adventures known to me is in Figure 2. The adventures I recommend for beginners are:

Eamon Master Diskette by Donald Brown. You *must* have this diskette to go on adventures. The Master Diskette includes The Beginners' Cave (a simple adventure), a couple of utility programs, and the special Master Diskette programs.

The Temple of Ngurct by James and Robert Plamondon. This is a very sophisticated adventure, if I do say so myself. My brother wrote the adventure itself, and I tinkered with the programs. Your character is sent on a quest to steal the medallion of the demon Ngurct.

Death Star by Donald Brown. This is by far the funniest adventure. Your character must shut off the tractor beam in the Death Star so he can escape in the Millenium Falcon. The Storm Troopers are even worse shots than they were in the movie. Donald Brown told me that this adventure was supposed to be a serious science fiction adventure, but failed. I think it is a great success as a slapstick fantasy adventure.

The Caves of Mondamen by John Nelson. Second only to Ngurct in sophistication, this adventure pits you against the evil Mondamen, who has an army, a magician, the demon Vaprak, a captive princess, and an underground stronghold. You have your wits and two friends, a big guy named Fred, and a short guy named Barney. This one is difficult, but fun.

Finding Eamon disks

Donald Brown told me that a group called Magnetic Fantasies is the official *Eamon* distributor. Whether this actually means anything is unclear. I have been unable to find Magnetic Fantasies' address, and I know nothing about them, beyond the fact that Donald Brown recommends them.

One source I *do* know something about is the Apple Avocation Alliance, Inc. (AAA). The AAA has 20 of the 25 "known" adventures, and will probably have them all by the time you read this.

The AAA's main function is to distribute public domain software for the Apple at low cost. There are several ways of getting programs from AAA:

1. Send a disk with ten Apple programs that aren't in AAA's catalog, and receive a disk of AAA programs in exchange. AAA even pays return postage.

2. If you don't have programs to exchange, you can always pay cash. The fee for copying AAA disks onto your disks is $1.00 per disk side (a common practice is to put programs on both sides of the disk).

3. If you don't want to send disks, you can buy them with the programs. AAA charges $3.50 for Verbatim Datalife disks, for $3 Memorex disks, and $2 for used disks.

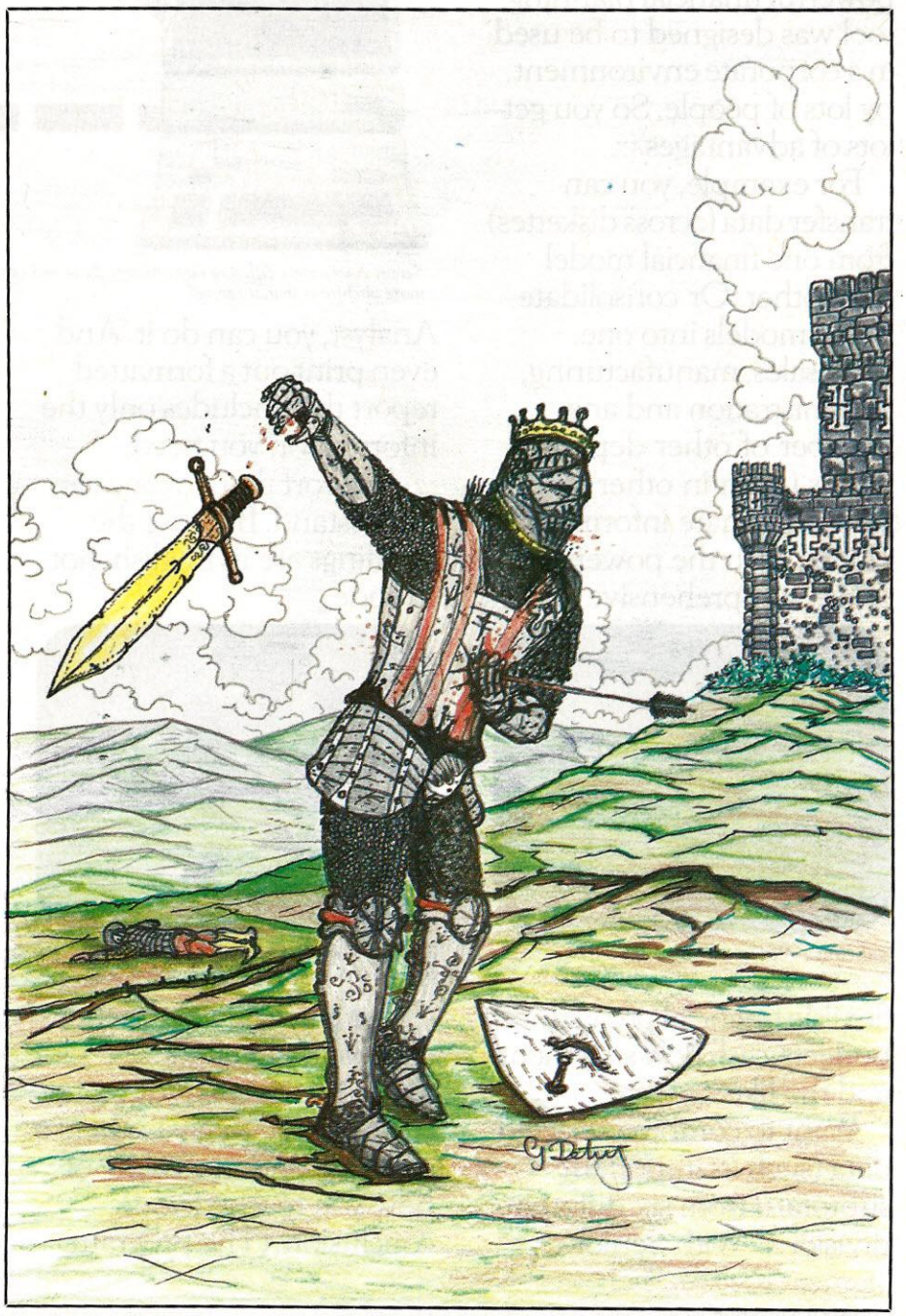
There is also a fee of $27 on your first order or exchange.

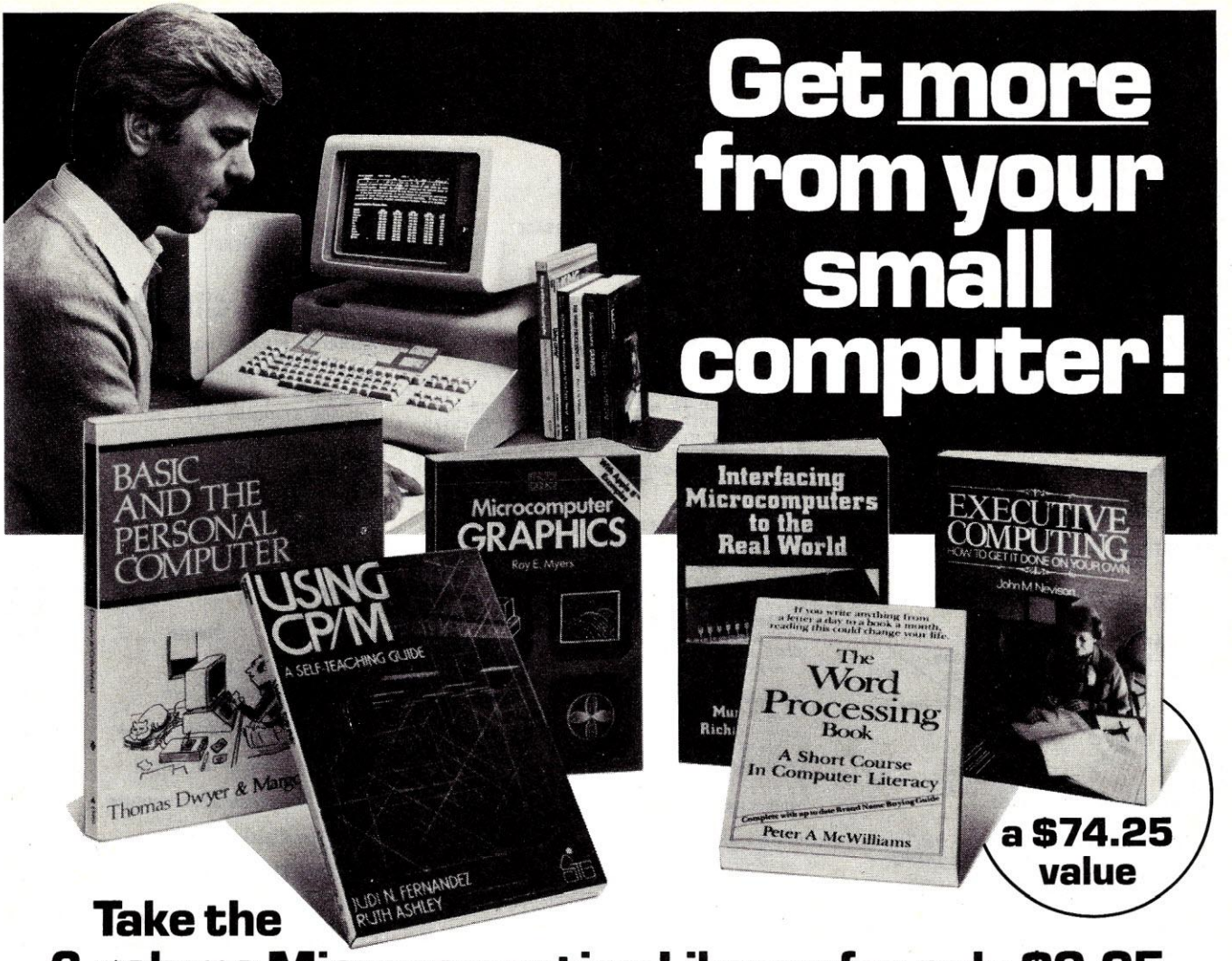
Send orders and inquiries to Ron Maleika, Apple Avocation Alliance, Inc., 721 Pike St., Cheyenne WY 82001.

A third source of *Eamon* adventures is John Nelson at 1226 E. University, Des Moines, IA 50316. John has written several excellent *Eamon* adventures, and always seems to have a few more in the works. He is also trying to coordinate the *Eamon* adventures by making sure new adventures don't have the same names and volume numbers. People who are considering writing an *Eamon* adventure should drop him a line.

There are some differences between John Nelson's inventory and AAA's, mostly because AAA doesn't have all of John's adventures at this writing.

Eamon adventures can be obtained from John Nelson for $5 each.





Take the 6-volume Microcomputing Library for only $2.95

when you join the Small Computer Book Club.

You simply agree to buy 3 more books—at handsome discounts—within the next 12 months.

This set of six carefully-selected books—a $74.25 value—will be your basic reference source of small computing.

BASIC AND THE PERSONAL COMPUTER.
Thomas A. Dwyer and Margot Critchfield. Clear, down-to-earth introduction to programming in BASIC. Detailed examples and numerous illustrations explain the wide range of applications possible with personal computers. Also, many step-by-step examples of word processing, computer games, and computer simulations. **Publisher's Price $14.95**

USING CP/M: A Self-Teaching Guide.
J.N. Fernandez and R. Ashley. A complete introduction to the CP/M ("Control Program") software package used on many advanced microcomputers. How to use CP/M to copy files, edit, test programs, translate programs, and more—regardless of the programming language the microcomputer uses. **Publisher's Price $12.95**

MICROCOMPUTER GRAPHICS.
Roy E. Myers. Provides the essential mathematics and programming techniques you will need for computer graphics applications, in BASIC, and shows you how to handle animated figures, peripheral equipment, colors and resolution, and many other topics. **Publisher's Price $11.95**

INTERFACING MICROCOMPUTERS TO THE REAL WORLD.
Murray Sargent III and Richard L. Shoemaker. The complete guide for computerizing your home, office, or laboratory. Tables, charts, and displays show you how to handle microcomputer software and operating systems; and how to monitor everything from the house lights to motors, switches, and display panels. Examples feature the Z-80 microprocessor. **Publisher's price $14.50**

THE WORD PROCESSING BOOK: A Short Course in Computer Literacy.
Peter A. McWilliams. You'll see how to save up to $15,000 by buying a small computer with word processing capacities. Includes a brand name buying guide. **Publisher's Price $9.95**

EXECUTIVE COMPUTING.
John Nevelson. 25 business methods illustrated by computer programs, in a step-by-step casebook. You'll find details on pricing techniques...long-range planning... corporate data bases...and much more. **Publisher's Price $9.95**

SMALL COMPUTER BOOK CLUB is a division of the Library of Computer and Information Sciences, the oldest, largest and most respected computer book club in the world. The SMALL COMPUTER BOOK CLUB will keep you up-to-date with the latest developments in software, improvements in hardware, programming languages, and much more.

So start enjoying the club's benefits today.

4 Good Reasons to Join

1. The Finest Books. Of the hundreds of books submitted to us each year, only the very finest are selected and offered. Moreover, our books are always of equal quality to publishers' editions, *never* economy editions.

2. Big Savings. In addition to getting the Microcomputing Library for $2.95 when you join, you keep saving substantially—up to 30% and occasionally even more. (For example, your total savings as a trial member—including this introductory offer—can easily be over 50%. That's like getting every other book free!)

3. Bonus Books. Also, you will immediately become eligible to participate in our Bonus Book Plan, with savings up to 70% off the publishers' prices.

4. Convenient Service. At 3-4 week intervals (16 times per year) you will receive the Book Club News, describing the Main Selection and Alternate Selections, together with a dated reply card. If you want the Main Selection do nothing and it will be sent to you automatically. If you prefer another selection, or no book at all, simply indicate your choice on the card, and return it by the date specified. You will have at least 10 days to decide. If, because of late mail delivery of the News, you should receive a book you do not want, we guarantee return postage.

If the reply card has been removed, please write to the **Small Computer Book Club Dept. Y-AA3, Riverside, N.J. 08075** to obtain membership information and an application.

Eamon, continued...

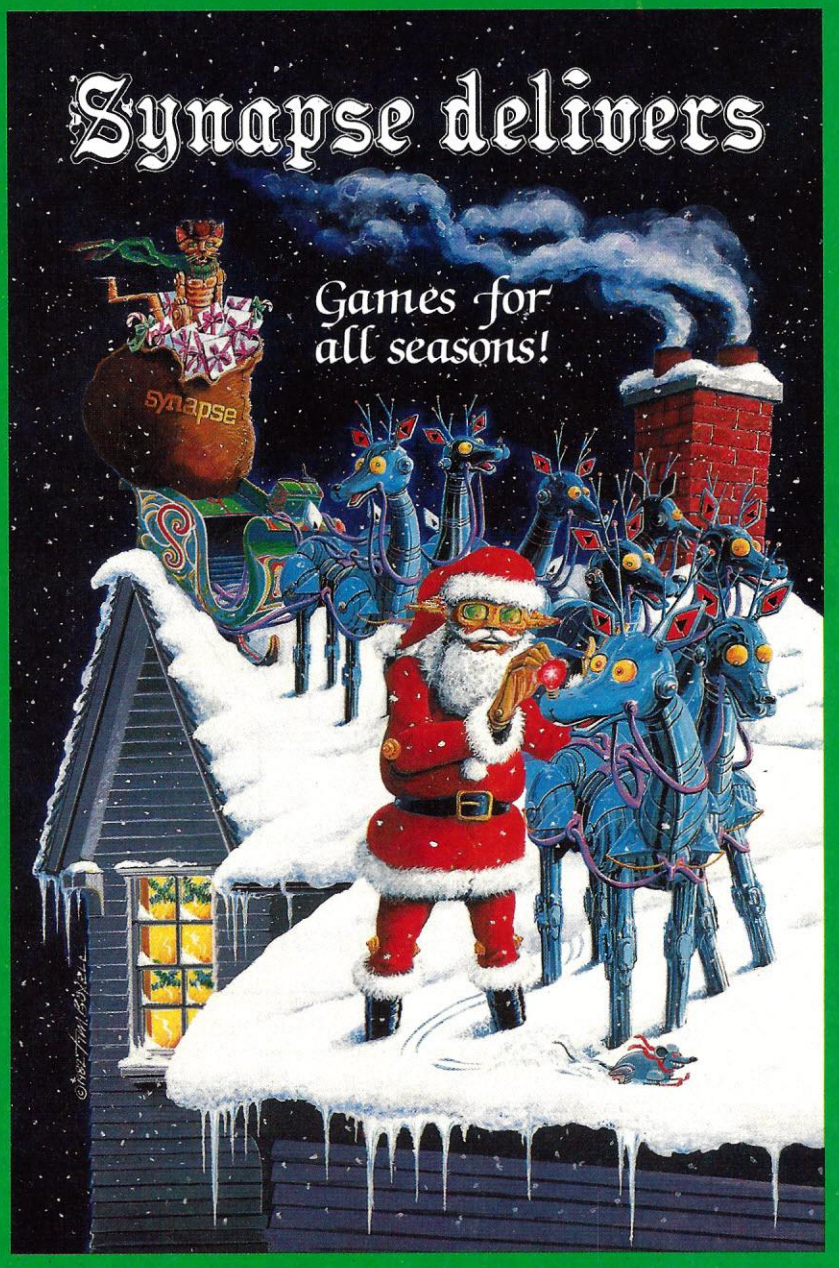
Figure 1: Part of an Eamon *adventure. A character named Marcus Antonius buys a spell in the main hall, and goes adventuring in The Beginner's Cave. After meeting a friendly warrior named Heinrich, Marcus Antonius encounters a wolf and a cave man.*

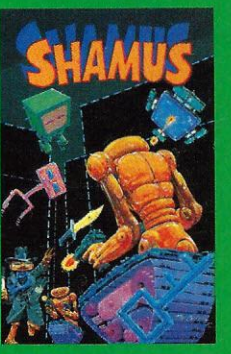
```
AS YOU WANDER ABOUT THE HALL, YOU
REALIZE YOU CAN DO ONE OF SIX THINGS--
  1.  GO ON AN ADVENTURE.
  2.  VISIT THE WEAPON SHOP FOR WEAPONS
      AND/OR ARMOUR.
  3.  HIRE A WIZARD TO TEACH YOU SOME
      SPELLS.
  4.  FIND THE BANKER TO DEPOSIT OR
      WITHDRAW SOME GOLD.
  5.  EXAMINE YOUR ABILITIES.
  6.  TEMPORARILY LEAVE THE UNIVERSE.

  (HIT THE KEY FOR YOUR CHOICE, 1-6)5

YOU ARE THE MIGHTY MARCUS ANTONIUS

YOUR ATTRIBUTES ARE:
  HD=14  AG=21  CH=22

YOU KNOW THE FOLLOWING SPELLS--
   NO SPELLS

YOUR WEAPON ABILITIES ARE--
  AXE   BOW   CLUB  SPEAR SWORD
   5%  -10%   20%   10%    0%

ARMOUR: LEATHER AND SHIELD   AE=0%

GOLD IN HAND=87, BANK=0

WEAPONS            CMPLX    DAM
SWORD                10%    1 D 8
(HIT ANY KEY TO CONTINUE)

AS YOU WANDER ABOUT THE HALL, YOU
REALIZE YOU CAN DO ONE OF SIX THINGS--
  1.  GO ON AN ADVENTURE.
  2.  VISIT THE WEAPON SHOP FOR WEAPONS
      AND/OR ARMOUR.
  3.  HIRE A WIZARD TO TEACH YOU SOME
      SPELLS.
  4.  FIND THE BANKER TO DEPOSIT OR
      WITHDRAW SOME GOLD.
  5.  EXAMINE YOUR ABILITIES.
  6.  TEMPORARILY LEAVE THE UNIVERSE.

(HIT THE KEY FOR YOUR CHOICE, 1-6)3

AFTER A FEW MINUTES DILIGENT SEARCHING,
YOU FIND HOKAS TOKAS, THE OLD MAGE. HE
LOOKS AT YOU AND SAYS, 'SO YOU WANT OLD
TOKEY TO TEACH YOU SOME MAGIC, HEH HEH?
WELL, IT'LL COST YOU. TODAY MY FEES ARE:

   BLAST  1429
   HEAL    476
   POWER    48
   SPEED  2381

WELL, WHICH WILL IT BE?'

(HIT THE KEY FOR YOUR SPELL, B,H,S OR P)
   POWER

HOKAS TEACHES YOU YOUR SPELL, TAKES
HIS FEE, AND RETURNS TO HIS STOOL ON
THE BAR.  AS YOU WALK AWAY YOU HEAR
HIM ORDER A DOUBLE DRAGON BLOMB.

AS YOU WANDER ABOUT THE HALL, YOU
REALIZE YOU CAN DO ONE OF SIX THINGS--
  1.  GO ON AN ADVENTURE.
  2.  VISIT THE WEAPON SHOP FOR WEAPONS
      AND/OR ARMOUR.
  3.  HIRE A WIZARD TO TEACH YOU SOME
      SPELLS.
  4.  FIND THE BANKER TO DEPOSIT OR
      WITHDRAW SOME GOLD.
  5.  EXAMINE YOUR ABILITIES.
  6.  TEMPORARILY LEAVE THE UNIVERSE.

(HIT THE KEY FOR YOUR CHOICE, 1-6)1

INSERT DISKETTE WITH ADVENTURE (OR KEEP
THIS DISKETTE FOR BEGINNERS CAVE) IN

DISK DRIVE IN SLOT SIX, DRIVE ONE THEN

HIT 'C'

YOUR COMMAND? FLEE

YOU ARE STANDING IN
  THE MIDDLE OF A LONG PASSAGE

  >> HEINRICH IS HERE.
  >> WOLF IS HERE.

YOUR COMMAND? FLEE

  YOU ARE IN A SMALL, STARK CELL WITH A
DOOR ON THE WEST SIDE.

  >> HEINRICH IS HERE.
IN THE ROOM IS A CAVE MAN, ROASTING A
DEAD RAT OVER A TINY FIRE. HE IS DRESSED
IN ANCIENT HIDES, AND HAS A BIG CLUB ON
THE FLOOR NEXT TO HIM. HE SEES YOU AND
SMILES. 'FAT ADVENTURER,' HE SAYS. 'YUM
YUM.'

YOUR COMMAND? ATTACK CAVE MAN
MARCUS ANTONIUS ATTACKS CAVE MAN
  --A HIT!

CAVE MAN TAKES DAMAGE BUT
   IS STILL IN GOOD SHAPE.
HEINRICH ATTACKS CAVE MAN
  --A MISS.
CAVE MAN ATTACKS MARCUS ANTONIUS
  --A MISS.

YOU ARE STANDING IN
  AN EAST CELL

  >> HEINRICH IS HERE.
  >> CAVE MAN IS HERE.

YOUR COMMAND?
                ATTACK CAVE MAN
MARCUS ANTONIUS ATTACKS CAVE MAN
  --A CRITICAL HIT!

CAVE MAN IS VERY BADLY INJURED.
HEINRICH ATTACKS CAVE MAN
  --A MISS.
CAVE MAN ATTACKS MARCUS ANTONIUS
  --A FUMBLE!
   WEAPON DROPPED!

YOU ARE STANDING IN
  AN EAST CELL

  >> HEINRICH IS HERE.
  >> CAVE MAN IS HERE.
YOU SEE THE CAVE MAN'S CLUB. IT'S A HUGE
PIECE OF WOOD, BOUND WITH IRON BANDS.

YOUR COMMAND? S

  YOU'RE IN THE MIDDLE OF THE LONG HALL.
DOORS ARE BOLTED ON BOTH SIDES OF YOU
(EAST AND WEST).  THE HALL EXTENDS NORTH
AND SOUTH.

  >> HEINRICH IS HERE.

YOUR COMMAND? W

  YOU ARE IN A SMALL, STARK CELL WITH A
DOOR ON THE EAST SIDE.

  >> HEINRICH IS HERE.
IN THE ROOM IS A HUGE WOLF. IT JUMPS UP
FROM WHERE IT WAS SLEEPING, AND BARES
ITS LONG YELLOW FANGS.

YOUR COMMAND? ATTACK WOLF
MARCUS ANTONIUS ATTACKS WOLF
  --A MISS.
HEINRICH ATTACKS WOLF
  --A MISS.
WOLF ATTACKS MARCUS ANTONIUS
  --A MISS.

YOU ARE STANDING IN
  A WEST CELL

  >> HEINRICH IS HERE.
  >> WOLF IS HERE.

YOUR COMMAND?
                ATTACK WOLF
MARCUS ANTONIUS ATTACKS WOLF
  --A MISS.
HEINRICH ATTACKS WOLF
  --A MISS.
WOLF ATTACKS MARCUS ANTONIUS
  --A MISS.

YOU ARE STANDING IN
  A WEST CELL

  >> HEINRICH IS HERE.
  >> WOLF IS HERE.

YOUR COMMAND?
                ATTACK WOLF
MARCUS ANTONIUS ATTACKS WOLF
  --A MISS.
HEINRICH ATTACKS WOLF
  --A MISS.
WOLF ATTACKS MARCUS ANTONIUS
  --A MISS.

YOU ARE STANDING IN
  A WEST CELL

  >> HEINRICH IS HERE.
  >> WOLF IS HERE.
```

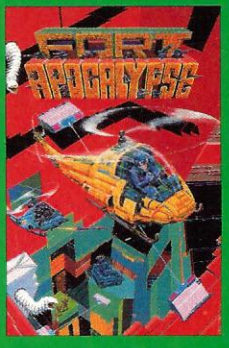
Figure 2: The Known Eamon *Adventures.*

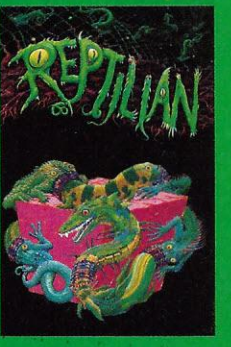
No.	Name	AAA No.
1	Master Disk & The Beginners' Cave	E01
2	The Lair of the Minotaur	E02
3	The Cave of the Mind	E03
4	The Zephur Riverventure	E04
5	The Castle of Doom	E05
6	The Death Star	E06
7	The Devil's Tomb	E07
8	The Abductor's Quarters	E08
9	Assault on the Clone Master	E09
10	The Magic Kingdom	E10
11	The Tomb of Molinar	E11
12	The Quest for Trezore	E12
13	The Caves of Treasure Island	E15
14	Furioso	E16
15	Heroes Castle	—
16	The Caves of Mondamen	E17
17	Merlin's Castle	—
18	Hogarth Castle	—
19	The Death Trap	—
20	The Black Death	E20
22	The Senator's Chambers	E19
23	The Temple of Ngurct	E18
—	The Lost Island of Apple	E13
—	The Underground City	E14
	Dungeon Designer's Diskette	EDD
	EAMON Utilities	EU

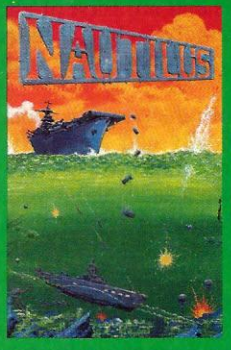
The numbers in the left-hand column are the ones John Nelson uses. The ones on the right are the AAA catalog numbers.

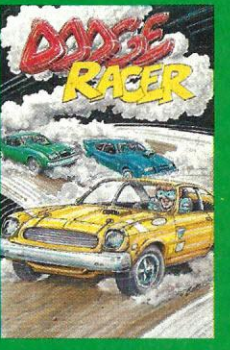


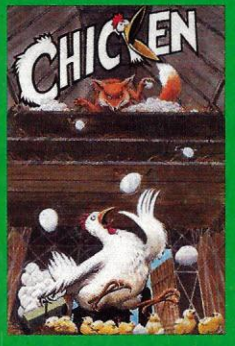


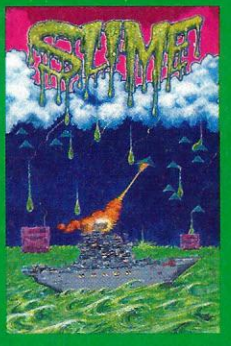


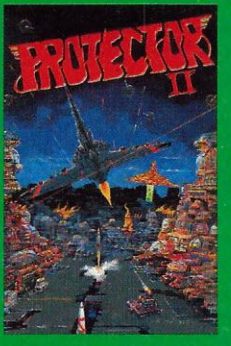


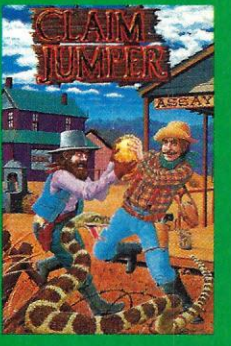












Most games available in disk, cassette, and cartridge for Atari 400/800 computers.
Many titles soon available for the VIC 20, VIC 64, and IBM-PC.

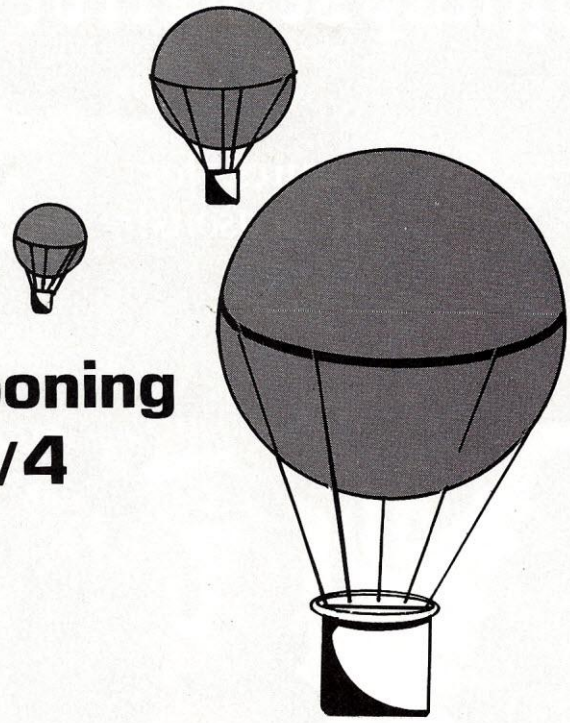
Atari is a registered trademark of Atari, Inc.
VIC 20 and VIC 64 are registered trademarks of Commodore, Inc.
IBM-PC is a registered trademark of IBM, Inc.
All game titles are trademarks of Synapse Software.

synapse

5327 Jacuzzi St., Suite I, Richmond, CA 94804

CIRCLE 276 ON READER SERVICE CARD

creative computing software evaluation



Hot Air Ballooning With The 99/4

Robert Cashman

Have you ever wanted to operate your own hot air balloon? You can do just that with a new program from Simulsoft called *Aeronaut*. It was written by Al Kanda in TI Extended Basic and is a simulation of the sport of hot air ballooning.

When I saw that the program was written in TI Extended Basic, I expected to see some fast moving and detailed graphics. What program written in TI Extended Basic doesn't make use of sprites in motion? As I read the accompanying instruction manual, I began to think that I was going to be disappointed.

On page 3 of the manual, there was a paragraph describing the program. In part it reads: "This program should not be judged on the basis of entertainment value alone (it may in fact seem slow to one accustomed to a steady diet of arcade-style games) but also on the basis of the unique experience it provides. The intent is for you to be an aeronaut while you are running this program and experience what it is like to fly a balloon."

OK, what would you experience if you were to fly in a balloon? Why don't we go on an imaginary ride? I suppose it would be something like this. Once the balloon is inflated to an upright position, we turn on the blast valve of the burner to increase the temperature in the balloon. This makes us airborne and off we go.

Because we want to obtain a certain height, we open our blast valve and keep it open until we reach our desired altitude. Not too much heat in the balloon now. We don't want it to overheat.

Boy, I'm glad we picked a beatiful day to go. You can see for miles. Doesn't the countryside look terrific from up here? Look! There's the town hall, and over there is the church steeple. Look how small they are! Ahh, this is great. Just floating by. No engine sounds. No control of direction. The wind just taking us where it will.

Robert W. Cashman, 11 Hallenan Ave., Lawrence, MA 01841.

creative computing
SOFTWARE PROFILE

Name: Aeronaut
Type: Game
System: TI99/4 or TI99/4A
Format: Cassette
Language: TI Extended Basic
Summary: A simulation of hot air ballooning
Price: $19.95
Manufacturer:
Simulsoft Computer Software
Box 3494
Scottsdale, AZ 85257

Can Aeronaut really stimulate our imaginary ride? Yes and no. First of all, the program is extremely technical in its approach to familiarizing the user with the sport.

After a nice introduction on your screen, both graphically and musically, you are asked if you want instructions. By pressing Y, you get facts about your balloon — facts such as its volume is 56,000 cubic feet and it has an 11 Mega-BTU/hour burner. You have 20 gallons of propane fuel. The maximum temperature your balloon can accommodate is 250°F. And your maximum payload is 650 pounds at sea level and 70°F derate 8 pounds per degree over 70°. The manual explains these facts further, but it would not hurt to brush up on your physics.

Running The Simulation

Next, you press ENTER for a display of your flight instruments. Here you find your variometer, pyrometer, altimeter, fuel level indicator, and compass. The variometer is for vertical velocity. It reads positive when you are ascending and negative when you are descending. The pyrometer reads the balloon temperature. The altimeter reads your altitude. The fuel level indicator keeps track of the amount of propane used. The compass indicates your heading.

Next, press ENTER for displays. These include the ambient temperature; the wind speed/direction, which is displayed in knots; and the direction in degrees from which the wind is blowing,

Pounding intergalactic warships into space dust can be fun. But admit it, you can zap aliens until the mega-star Argos goes supernova, and it won't improve your English grades one quark. Well, Reader's Digest has three new vocabulary games that are entertaining, challenging, AND educational. Each game can be played at three successive vocabulary levels, children through adult. You'll meet up to 100 words per level, up to 300 words in each game. **The Reader's Digest Vocabulary Series** helps build vocabulary and improve related word skills, such as decoding and recognizing synonyms and antonyms. But — you may have so much fun, you'll forget you're learning.

Reader's Digest®

VOCABULARY SERIES

The Chambers of Vocab (age 9 and older)
You have excelled over all others in word skill. Now you face the final challenge—the test of the great maze, The Chambers of Vocab. Only by subduing the word beasts within can you prove your courage and skill.

Trickster Coyote (age 8 and older)
In the old days, people told the truth. But Coyote skulked into camp one night, stealthy as a lizard, and made off with the Totem of the Straight Tongue. Now the people tell lies and talk in circles. But you can snatch back the Totem . . . if you can stay on Coyote's trail and avoid his tricky words.

Key Lingo (age 11 and older)
You are a seafaring word trader. On a recent swing through the Sea of Words, you are rewarded with a piece of the legendary Penguin Parchment. It is said the Parchment marks the location of Key Lingo — an uncharted atoll, notorious as a pirate stronghold. You must summon all your word-trading skill to win more pieces of the Parchment. Then Key Lingo — and its priceless pirate hoard — can be yours!

Features
- Exciting, high res graphics
- Animation
- Color
- Optional sound
- Built-in dictionary
- Add your own new words

Systems
Apple® II and II Plus: 48K
Atari® 800: 48K (Available 1983)
IBM® Personal Computer (Available 1983)

Suggested Retail Price: $48.96 each

The Reader's Digest Vocabulary Series is available at your software dealer. Or order directly from Reader's Digest by using the coupon below.

Dealers: please write to Reader's Digest (address below) for more information.

Games that are good for you!

Reader's Digest Software is fully warranted for 90 days. Complete details available upon request by writing to Reader's Digest at the address below.

Prices are FOB shipping point and subject to change without notice. Program availability dates subject to change. Merchandise may be returned in original condition within 30 days of delivery. Contact Reader's Digest first (914/769-7000 ext. 2763) for instructions and return label.

Registered trademarks: Apple—Apple Computer, Inc.; Atari—Atari, Inc.; IBM—International Business Machines Corp.

☐ **YES!** I'd like to have fun building vocabulary skills with **The Reader's Digest Vocabulary Series.** Please rush me the titles indicated below (currently available for Apple II and II Plus only).

SAVE! Include payment with order and save shipping costs.
☐ Payment enclosed. ☐ Bill me (subject to credit approval).

CC 1/83

Qty.	Order #	Title	Price Ea.	Total
	#S97/105	The Chambers of Vocab	$48.96	
	#S98/105	Trickster Coyote	48.96	
	#S99/105	Key Lingo	48.96	
		Please check below for applicable sales tax:		
		Total order:		

Name

Address

City/State/Zip

Area Code/Phone

Signature **Date**

Sales Tax:
NY residents add 4%*;
PA residents add 6%*;
ME residents add 4%*;
GA residents add 3%*;
CA residents add 6%*.
*Plus applicable local taxes.

MAIL TO:
Reader's Digest Services, Inc.
Microcomputer Software Division
Pleasantville, New York 10570

CIRCLE 246 ON READER SERVICE CARD

which is measured clockwise from north. The distance drifted is the distance that your balloon is carried by the wind and is measured in feet from the launch site.

The display section also mentions that your height relative to the terrain along your flight path is displayed here. When your altitude exceeds 1550 feet, the display scale changes. In other words, at 1550 feet your balloon disappears from your monitor. It is at this time that the scale of what you were looking at changes so that you can once again have the balloon and the terrain on your screen together.

Pressing ENTER again gets you your control keys. The spacebar turns your burner on allowing you to ascend. If you want to descend, simply allow the balloon to cool. Should you want to descend in a hurry, press M. This opens the maneuvering vent to release hot air. Pressing D opens the deflation port to deflate the balloon rapidly after landing so it won't be dragged along the ground. Pressing Q allows you to quit or abort a launch. Pressing T allows you to switch fuel tanks.

The next areas discussed are your preparation for launch, inflation and lift off, display boundaries, and landing. As all of these areas are discussed at length in the manual, I will not describe them here.

Now that we are ready for our trip, let's discuss the object of this simulation. The object is to travel in your balloon over terrain which includes obstacles without crashing or being shot down. The obstacles include a couple of small mountains, a large mountain, a fruit orchard, some power transmission lines, and a military base by the name of Yellow Sands Proving Grounds. The balloon crashes if it collides with any slope or ground obstacle, or if he makes ground contact at a downward velocity in excess of 800 feet/minute. The balloon will be destroyed by heat-seeking missiles if the distance drifted is greater than 24,800 feet.

Evaluation

Now Simulsoft never called this program a game. It is a simulation. I suppose that means it should be considered as a realistic adventure in a hot air balloon.

Aeronaut succeeds in the technical aspects as it acquaints the user with the sport of hot air ballooning. But at the same time it fails to stimulate the desire to ever partake in such an adventure.

As mentioned during our imaginary trip, much of the excitement of ballooning comes from the sensation of the panoramic views below — being on top of the world. *Aeronaut* does not simulate this.

Let's look at the program from an entertainment point of view. If there is no panoramic scenery, what is there to hold the user's interest? The main thing is the realization that if I don't properly control the valve, I'll crash. It is unfortunate that obstacles that would require a spontaneous reaction were not included. It would have made *Aeronaut* much more fascinating. What type of obstacles? How about a sudden thunderstorm complete with lightning and torrential rains? Or a flock of birds coming right at you? I think you get the idea.

It is apparent that Mr. Kanda and Simulsoft spent a great deal of time and effort in producing this program. As the owner of a TI99/4, I appreciate their developing software. I do, however, wish that they had taken the program a couple of steps farther toward a more realistic simulation. □

COMSTAR'S WRITTEN GUARANTEE
AIR*SHIPPING WITHIN 48 HOURS *CONT. U.S.A. *EXCEPT WHERE NOTED #

ATARI

32K RAM..... $ 80
48K RAM..... 125

	LIST	NOW
STAR CONCENTRATION (T)16K	$ 14.95	$ 10
PREPPIE (D,T)16K	29.95	23
CENTIPEDE (C)	49.95	34
SIGNALMAN MODEM	99.00	85
CANYON CLIMBER (D,T)16K	29.95	23
WIZARD OF WOR (D)16K	39.95	29
FROGGER (D,T)16K	34.95	26
SHOOTING ARCADE (D,T)16K	29.95	23
TIGERS IN THE SNOW(D,T)48K	39.95	29
BAJA BUGGIES (D,T)16K	31.95	25
SHAMUS (D,T)16K	34.95	24
EASTERN FRONT (D,T)16K	29.95	24
BANDITS (D)48K	34.95	24
MICROSOFT BASIC (D)32K	89.95	67
BASIC A+ (D)32K	80.00	62

NEWPORT PROSTICK....$ 31
VOICE BOX..... 139

	LIST	NOW
MACRO ASSEMBLER(D)32K	$ 89.95	$67
ASSEMBLER EDITOR (C)	59.95	46
PILOT (C) #	79.95	59
LETTER PERFECT (D)24K #	149.95	112
TEMPLE OF APSHAI(D,T)32K	39.95	29
INTRUDER (T)16K	29.95	23
ZORK I OR II (D)32K	39.95	29
CROSSFIRE (D,T)16K	29.95	23
ALI BABA (D) 32K	32.95	25
K-RAZY SHOOTOUT (C)	49.95	38
CAVERNS OF MARS (D)16K	39.95	29
PAC MAN (C)	44.95	34
PROTECTOR (D,T)32K	34.95	26
THRESHOLD (D)40K	39.95	29
VALFORTH (D)16K #	45.00	36

HEAR ATARI SOUNDS THROUGH YOUR STEREO SPEAKERS WITH
STEREODAPTER — FOR ATARI 800
• NO ASSEMBLY REQUIRED • CAN USE STEREO HEADPHONES
• SHIELDED CABLE • ADJUST TONE & VOLUME WITH STEREO CONTROLS
STEREODAPTER WITH 16 FT CABLE $8 WITH 26 FT CABLE $10
DEALER INQUIRIES INVITED

(C) = CARTRIDGE (D) = DISK (T) = CASSETTE

apple®

	LIST	NOW
SERPENTINE	$ 34.95	$ 26
SNACK ATTACK	29.95	22
LABYRINTH	29.95	23
DUELING DIGITS	29.95	23
S.A.M.	124.95	95
ZORK I OR II	39.95	29
WIZARDRY	49.95	38
SWASHBUCKLER	34.95	26
BASIC COMPILER (DATASOFT)	99.95	79
ROACH HOTEL	34.95	26
RENDEZVOUS	39.95	30
TG JOYSTICK	59.95	45
PFS #	125.00	95
CROSS FIRE	29.95	23
THRESHOLD	39.95	30
PEGASUS II	29.95	23
FROGGER	34.95	26
STAR BLASTER	29.95	23
CONGO	34.95	26
GOLDRUSH	34.95	26
TWERPS	29.95	23
CYCLOD	29.95	23
BATTLE OF SHILOH	39.95	30
TIGERS IN THE SNOW	39.95	30
VISICALC 3.3 #	250.00	179
PINBALL	29.95	23

VIC-20

	LIST	NOW
RICOCHET (T)	$ 19.95	$ 17
3K CARTRIDGE	39.95	33
EXPANSION CHASSIS	119.95	99
KING ARTHUR'S HEIR (T)	29.95	23
8K CARTRIDGE	89.95	74
WORD CRAFT 20 WITH 8K(C)	269.95	195
BUTI WITH 3K (C)	89.95	75
KOSMIC KAMIKAZE(T)8K	24.95	20
SUB CHASE (T)13K	24.95	20
OUTWORLD (C)5K	49.95	36
SPIDERS OF MARS(C)5K	49.95	36
METEOR RUN(C)5K	49.95	36
VI TERM A(T)5K	19.95	17
VI CALC (T)5K	14.95	13
VI CAT (T)8K	24.95	20
VI CHECK (T)13K	24.95	20
AMOK (T)5K	24.95	20
AMOK (C)5K	39.95	30
ALIEN BLITZ (T)5K	24.95	20
ALIEN BLITZ (C)5K	39.95	30
SNAK MAN (T)6K	24.95	20
SUPER HANGMAN(T)8K	18.95	16
THE ALIEN (T)8K	24.95	20
3D MAZE (T)5K	14.95	13
RENAISSANCE (C)5K	49.95	36

master charge VISA

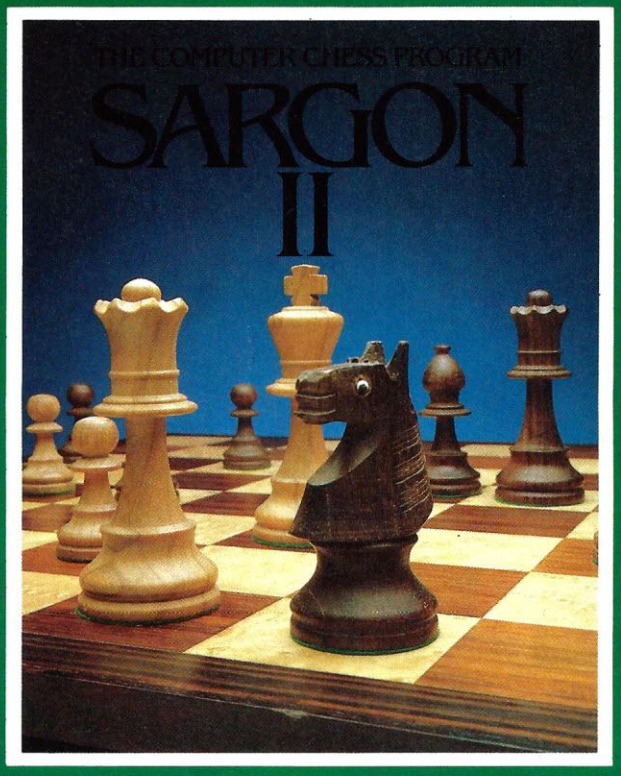
COMSTAR
P.O. BOX 1730
GOLETA, CA 93116
(805) 964-4660

ORDERS ONLY: CALL TOLL FREE 800-558-8803
IN CALIF. (805) 964-4660 or send check, money order or credit card number and exp. date. Include $2.00 for shipping. Add 3% for Visa or MC (except Calif.). Calif. add 6% tax. There is a $2.50 charge for COD. Please include type of computer. (Checks—10 days to clear.)

CIRCLE 147 ON READER SERVICE CARD

The Classics from Hayden Software

by Dan and Kathe Spracklen



Play Chess at your Best!

Choose from seven levels of play with Sargon II, the Computer Chess Champion. It's fast and tough, with striking graphics. Every nuance of grand master chess is here: capturing en passant; castling; and, if you dare, even the "kibitz" where Sargon will give you a hint—or set a trap. Whether you're a beginner or a champion, you'll enjoy hours and hours with Sargon II; a worthy opponent for you, and a true classic.

Apple II; Disk and tape
TRS-80; I or III Disk and tape
PET; Disk and tape
Atari: Disk and tape
8″ CP/M

A Game of Strategy and Sudden Flips

Reversal, winner of the First Man-Machine Othello™ Tournament, is a mind-testing classic with nine levels of play and three strategy levels within each. You can even play against a human opponent—but that might soon be too easy for you. It's a deceptively simple game: you trap your opponent's piece between two of yours, and capture the piece for yourself. Sound easy? Beware! Reversal has a way of turning the tables on you!

*OTHELLO is a registered trademark of Gabriel Industries, Inc.

Apple Disk, Atari tape

Tape $29.95 5″ Disk $34.95 8″ Disk $39.95

Available from your local dealer or call:

1-800-343-1218

(in MA call 617-937-0200)

HAYDEN SOFTWARE

EVERYONE NEEDS A . . .

UNINTERRUPTABLE POWER SOURCE

ADVANCED DESIGN
NEW RELIABILITY
GUARDIAN PROTECTS
ELECTRONIC SAFETY
LIFESAVER FOR DATA

$595

SAVE YOUR DATA FROM POWER OUTAGES!

BACKUP FOR YOUR COMPUTER, MONITOR, PRINTER AND 5¼" FLOPPY AND HARD DISC DRIVE

• Automatically stops annoying problems from power line interruptions and brown outs • You need standby power to save data • Maintenance free backup power available in 115 volt or 220 volt • 50 or 60 HZ • 150 watts • Complete versatility — operate your system from a 12 volt source, i.e., automobile cigarette lighter, boat or airplane • Rugged self contained gel cell battery • No voiding warranty — no cutting wires • Automatic audio alarm warning tone during commercial power failure or interrupt • UL listed • FCC approved • Transient voltage suppressor gives added insurance from line voltage spikes, utilizing Zener Ray™ • Green/red LED power status indicator • Green — normal AC line power • Slow blinking red — at least 6 minutes of remaining standby power • Fast blinking red — approximately 2 minutes of remaining battery power • Solid state technology unexcelled by any UPS power unit in its class.

RH ELECTRONICS, INC.

COPYRIGHT © 1981 - PATENTS PENDING

566 IRELAN, BUELLTON, CA 93427

(805) 688-2047

CIRCLE 298 ON READER SERVICE CARD

SEE YOUR RH ELECTRONICS PRODUCTS DEALER

FOR YOUR APPLE II*:

SUPER FAN II™	$ 74.95
SUPER FAN II™/ZENER RAY™	$109.00
SUPER RAM II™	$125.00
RH 12 VOLT TRANSVERTER	$149.00

FOR MICRO COMPUTERS:

GUARDIAN ANGEL™	$595.00

RH ELECTRONICS, INC.

COMPUTER PRODUCTS
DESIGNING • MANUFACTURING
ELECTRONIC ENGINEERING

COPYRIGHT © 1981 — PATENTS PENDING

566 Irelan, Buellton, CA 93427
(805) 688-2047
8:00 TO 5:00 CALIFORNIA TIME

SUPER FAN II™

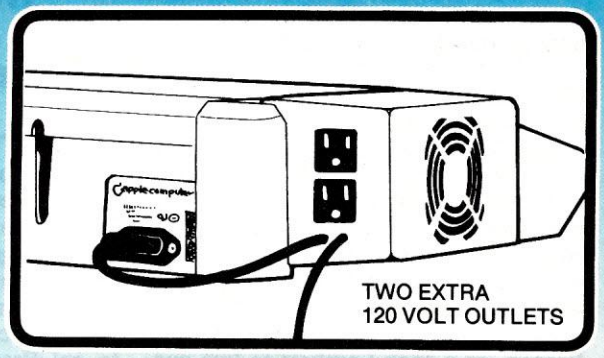
FOR YOUR APPLE II* COMPUTER

One Year Warranty

$74.95

With Zener Ray™ Protection $109.00

MASTERCARD — VISA



"COOL IT"

- ALSO FITS ON APPLE'S* NEW MONITOR STAND
- RED PILOT LIGHT ON/OFF SYSTEM SWITCH
- CLIPS ON — NO HOLES OR SCREWS • REPLACEABLE SWITCH
- AVAILABLE IN 120V or 240V AND 50/60 HZ • DURABLE MOTOR
- REDUCES HEAT CAUSED BY EXTRA PLUG-IN CARDS
- SOLD WORLD WIDE • UNIQUE 1 YEAR WARRANTY
- TAN OR BLACK COLOR • QUIETEST FAN ON THE MARKET
- INCREASED RELIABILITY — SAVES DOWN TIME AND REPAIR CHARGES
- LOW NOISE DUE TO DRAWING EFFECT OF AIR THROUGH YOUR COMPUTER AND SPECIAL FAN AND MOTOR DESIGN
- TWO EXTRA 120V OUTLETS FOR MONITOR AND ACCESSORIES TURN ON WHEN YOU TURN ON YOUR FAN (NOT AVAILABLE ON 240V MODEL)

SUPER FAN II™ WITH ZENER RAY OPTION $109.00

ZENER RAY™ TRANSIENT VOLTAGE SUPPRESSOR

OUR BUILT IN ADVANCED DESIGN UNIT GIVES
DRAMATIC COST SAVINGS — STOPS ANNOYING DOWN TIME
INSURANCE FROM VOLTAGE SPIKES - GLITCHES

DANGEROUS VOLTAGE SPIKES CAN JEOPARDIZE YOUR COMPUTER SYSTEMS
PROTECT COMPUTER - DISK DRIVE - PRINTER AND MONITOR

NO CUTTING WIRES • WON'T VOID WARRANTY, JUST PLUG IN SUPERFAN II WITH ZENER RAY

OTHER PRODUCTS BY RH ELECTRONICS, INC.

SUPER RAM II™ 16K RAM CARD FOR YOUR APPLE II. 2 YEAR WARRANTY $125

GUARDIAN ANGEL™ AN UNINTERRUPTABLE POWER SOURCE $595

12 VOLT TRANSVERTER 12 VOLT — RUNS YOUR APPLE II COMPUTER AND AND 5¼" DRIVE FROM YOUR CIGARETTE LIGHTER $149

*Registered trademarks of Apple Computer Inc.

DEALER INQUIRIES INVITED

CIRCLE 299 ON READER SERVICE CARD

creative computing software evaluation

Gridiron Action and Antics

Cypher Bowl

Wayne Hixson
and
Sheldon Leeman

"OK, Hixson. Zorn's hurt and out for the rest of the game. You're our man—now go out there and get 7!"

"Coach, you can count on me... Guys, its a 32 Up and Out. Largent, I'll be looking for you at the five. Break!"

A wild fantasy from the deranged mind of a short, slow, and (slightly) overweight sports nut? Not entirely—not with my Atari 800 and *Cypher Bowl,* an excellent two-player football game program by Bill Depew. Now we would-be jocks can step into the electronic shoes of a Jim Zorn, a Walter Payton, or a Jack Lambert to live our fondest fantasies in perfect safety. No injuries, unless you count acute "controller thumb," a malady now surpassing tennis elbow in popularity.

Cypher Bowl is attractively packaged in a sturdy, colorfully illustrated box. Both cassette and diskette versions are included (they are the same). The documentation is very good. The user manual explains the game clearly and gives good tips on playing techniques. Two playcards are included, laminated in plastic to withstand a lot of handling. Each playcard includes the offensive and defensive formations and plays. Sketches of each play show the patterns that the receivers, blockers, and defenders will run.

Wayne E. Hixson, 115 NW 39th Street, Seattle, WA 98107.
Sheldon Leeman, 14400 Elm St., Oak Park, MI 48237.

Once you have read the instructions and studied the plays, the game can begin. The program is self-booting and no cartridge is needed. The opening display is of the title, manufacturer, copyright notice, and a portion of the field. The crowd roars, and you're ready to go! Pressing any key turns on the standard display.

creative computing
SOFTWARE PROFILE

Name: Cypher Bowl
Type: Football Simulation
System: Atari 400 or 800, 16K
Format: Disk or Cassette

Language: Machine language
Summary: Excellent combination of strategy and action
Price: $49.95
Manufacturer:
Artsci, Inc.
10432 Burbank Blvd.
N. Hollywood, CA 91601

In the center of the screen are the field and the two five-man teams. You have a blimp's-eye view of the field, which runs vertically on the screen. The view is always centered on the ball. About 30 yards of the field are visible. The score, quarter, and time remaining are displayed on the top of the screen. On the bottom are the down, yards to go, and the time-outs remaining.

The game is played in four simulated 8-minute quarters. There is no kick-off. The blue team starts with the ball on their 20-yard line, with the white team defending the top of the screen. Each player begins by selecting one of four formations from the playcards. On offense, you can spread your receivers, or play them in tight. The defense can put everyone up front, or drop up to three players back to play pass defense. After both have chosen, the teams move into position.

The players scrutinize each other's calls, then pick one of four possible plays allowed for the particular formation. Offensive possibilities range from quick openers to the bomb. The defense can opt for a strong pass, strong run, or balanced defense. What you choose depends on the formation your opponent unveils. For example, if you call a defense strong against the run and the offense deploys in a spread formation, you can still make the best of it by calling a zone defense to protect against the probable pass. However, your chances are poorer than if you had elected a strong pass defense formation to begin with.

January 1983 © Creative Computing

SINGLES' NIGHT AT MOLLY'S

By Norman J. Wazaney Jr.

You never dreamed Solitaire could be so fascinating.

Solitaire in a saloon can be fun but it's better on your Apple*. Fair warning: if you get hooked on Solitaire, beware of this game! "Singles' Night at Molly's" is actually two basic solitaire card games with several variations permitting you to use the skill level and strategy you enjoy most. Play alone or against other players, where a rating system declares the winner. Features High Resolution color graphics, full user documentation and various scoring potentials.

There are hours, days, even years of pleasure to be derived from this intriguing game. Available now for only $29.95 at computer stores.

To order by phone, call 800-526-9042 and use your Visa or MasterCard. All shipments made the same day in which orders are received. To order by mail, add $1 for shipping charges and send your check to:

Soft Images, 200 Route 17, Mahwah, NJ 07430.

"Singles' Night" runs on 48K Apple II, Applesoft in ROM. 3.3 DOS/One Disk Drive

*Apple is a registered trademark of Apple Computer Co.

CIRCLE 316 ON READER SERVICE CARD

Soft images
DIVISION OF DECISION SYSTEMS INC

This method of play calling is well thought out and superior to the other games I have played. Both players have options after they see the other's call, instead of the defense only.

Another nice touch is the way *Cypher Bowl* handles the 30-second clock. There is no delay of game penalty, but the clock is automatically stopped after 30 seconds until the play commences.

If you make the right call, your left end will take the right linebacker out of the play, and leave a hole a truck could drive through.

The *Cypher Bowl* clock also stops between quarters, for the two-minute warning, for time-outs called by the players, and on incomplete passes and out of bounds plays.

After selection is complete, play is initiated as the offensive player moves the joystick. Instantly, the scoreboard information disappears and your view of the field increases to fifty yards. This is especially nice on pass plays, as the receivers would soon run out of view otherwise. During play, the offensive player controls the quarterback or the receiver, whichever has the ball.

As the manual points out, it is easier if you visualize yourself as controlling the ball, with the player coming along for the ride. On defense, you control the middle linebacker. The remaining eight players are controlled by the computer, following the patterns shown on the playcard.

Think about that for a moment. A total of ten players, moving in individual patterns. How? Aren't there only four players in Atari Player/Missile graphics? Yes, but *Cypher Bowl* shows just what a good programmer can do with this system. In order to get more than four players, single players are moved to different screen locations between TV frames, every 1/60 second. The images alternate so fast that the eye can't discern the change, except for some minor flickering.

As a result of the individual control of each player, blocking, passing, and pass coverage patterns are exceptionally realistic. If you make the right call, your left end will take the right linebacker out of the play and leave a hole a truck could drive through. However, if your opponent outguesses you and fills that area, you will be lucky to get back to the line of scrimmage.

Cypher Bowl excels in its simulation of the passing game. This was also the hardest part of the game to learn. Not only do you have control of passing direction, you must also control distance. In the other games I have played, a thrown ball will travel indefinitely, until it hits a receiver or defender, or goes out of bounds. Any eligible receiver (offense or defense) in the path of the ball will catch it, whether 6 or 60 yards from the quarterback.

Cypher Bowl adds a third dimension —height of the ball above the ground. Now you can throw the ball over the head of the defender. Of course, this also enables you to overthrow your own man, which I have been able to do very consistently. A pass is launched by pressing the joystick button and pushing the stick toward the target. The distance is determined by how long you hold the button down.

The height of the ball cannot be shown on the screen, so sound is used. A rising tone indicates a rising ball, and vice-versa. Once thrown, you can control the direction of flight with the joystick to "fine tune" it to the receiver. I think that this is one weak point of the program. The ball is too controllable. You can start it toward one sideline and then steer it clear across the field, or even reverse it back toward the quarterback. The magnitude of control should be reduced to a little nudging.

Another superior feature of *Cypher Bowl* is the option to throw to either of two receivers on most plays. You also have some control of the receivers on pass plays. Once the ball starts its downward flight, pressing the joystick button causes the receivers to break off their patterns and move back toward the ball.

As you can imagine, orchestrating all this activity in the period of about two seconds requires a lot of practice, but what a feeling when you float the ball over an onrushing linebacker to the tight end cutting back in front of the safety. A caution—there is only a five to seven yard window in which the receiver can catch the ball. If you overthrow, the defender is likely to get it.

You might think all this control would make an accomplished player unstoppable. Not so! This game provides a few tricks for the defense as well. If your defensive linemen get within a few yards of the quarterback before he throws, the ball will be batted down. Once the ball is in the air, you can make your defensive backs cut toward it by pressing the joystick button. All in all, the offensive/defensive balance is good.

The kicking game is good. The ball is kicked by pressing the button. Instead of going a random distance, the longer you wait before you press the button, the farther the ball will go. A split second too long, though, and it will be blocked. There is no difference between a field goal and a punt. If the ball goes between the uprights, it's worth 3 points.

I have played *Cypher Bowl* for over 30 hours now, and the more I play, the more I like it. The realism is a step above the other games I have played. The graphics, in spite of the lack of detail, are quite good. Player/Missile graphics, fine scrolling, and mixed modes are used very effectively. The animation is both smooth and fast.

The playability is good, and it's not an easy game to master. I'm still below 50% in the passing game, but I'm getting better. I think it is this continuing challenge in any game that keeps you playing it, along with the fun.

In summary, this is a worthwhile game. If you're a "stats junkie," it probably won't be your cup of tea, but if you like a sports game that makes you think and participate, I believe you'll love this one.

Now, guys, how about a solitaire version? I have a hard time finding opponents during my normal game-playing hours. —*WH*

Krazy Antiks

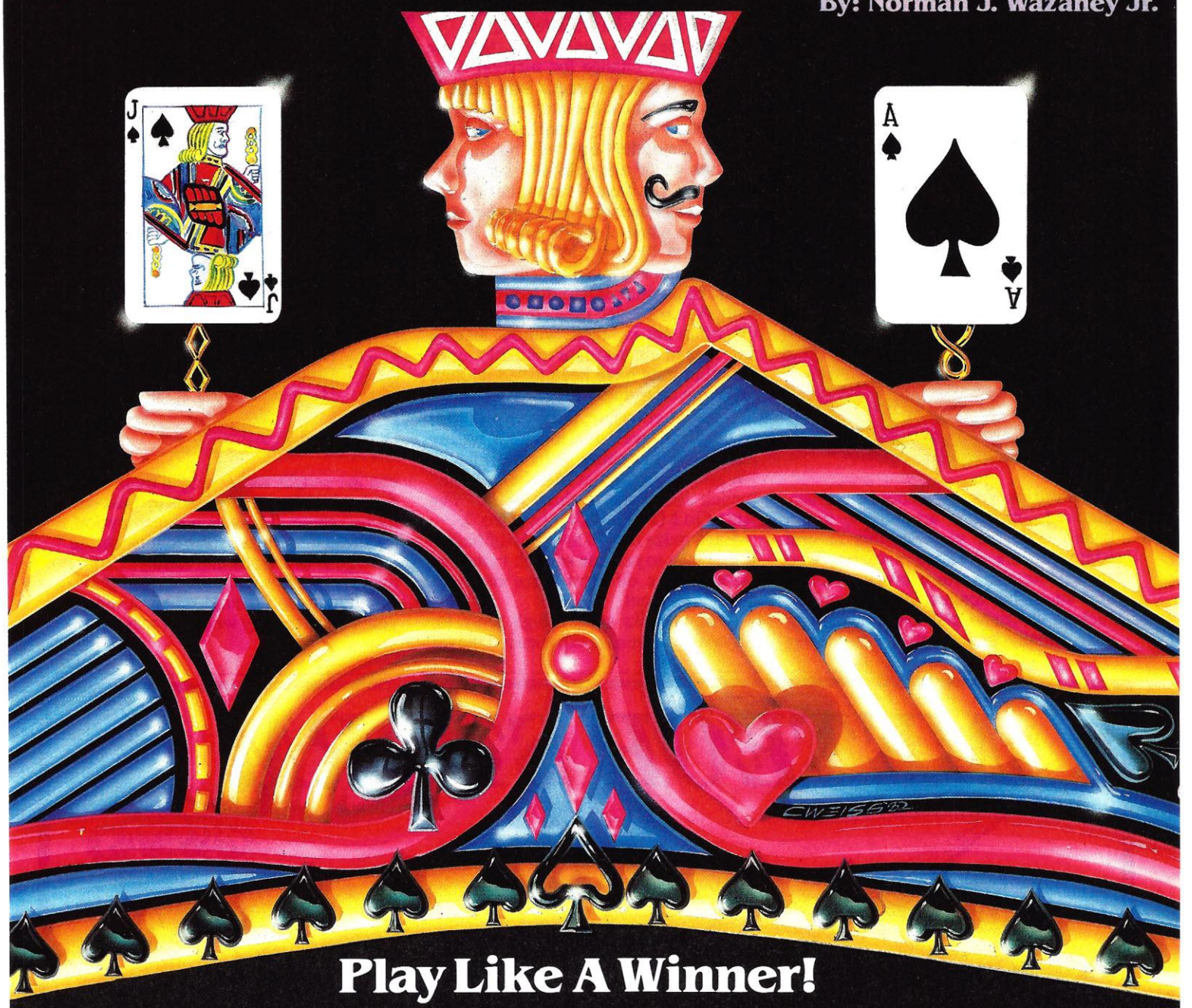
Don't be confused by the pun. The Antic that everyone associates with Atari computers is the support chip that makes possible the superb graphics needed for all of those neat arcade-type games. The Antiks in the title of this product refers to the insect you need in order to have a picnic. When the two get together, you wind up with a neat arcade-type game with great graphics, and everyone has a picnic.

Krazy Antiks is the fourth game cartridge released for the Atari 400/800 computers, and it bucks the trend of "me-too" arcade-style games. Lately it seems that everyone is trying to cash in on the arcade craze by serving the warmed-over remains to computer owners. Even K-Byte's earlier ventures into game programming tended to follow the heavily beaten path. But *Antiks* has just enough of a twist to be considered a new idea in a market saturated with retreads.

I must concede that the locale of the action is nothing novel—the ant hill in question strongly resembles the type of maze used in any number of games spawned by that prolific procreator,

BLACK JACK STRATEGY II

By: Norman J. Wazaney Jr.



Play Like A Winner!

This complete system provides simple, step-by-step instructions to help you raise your level of play regardless of your present skill. Features include a SIMULATOR for testing betting and playing strategies, a TUTOR to teach the strategies and a GAME with all the options available at the casinos. Another outstanding feature is a Strategy Table Compiler for ease of entering and visualizing your playing and betting strategies.

The system is able to simulate millions of hands and provides better insight into computing odds and house percentages. You may be surprised to discover how many of your pet theories are less than accurate.

Black Jack Strategy runs on 48K Apple II, Applesoft in ROM.
3.3 DOS/One Disk Drive Printer Optional

OUR SOFTWARE IS UNPROTECTED PERMITTING CONVENIENT BACK-UP.

The comprehensive documentation is packaged in a handsome, easel-backed binder. Available now for only $69.95.

Since winning is always more fun than losing, be fair to yourself and get Black Jack Strategy before your next visit to the casino (where $69.95 will not go very far).

To order by phone, call 800-526-9042 and use your Visa or MasterCard. All shipments made the same day in which orders are received. To order by mail, add $1 for shipping charges and send your check to:

Soft images
DIVISION OF DECISION SYSTEMS INC.
200 Route 17, Mahwah, N.J. 07430.

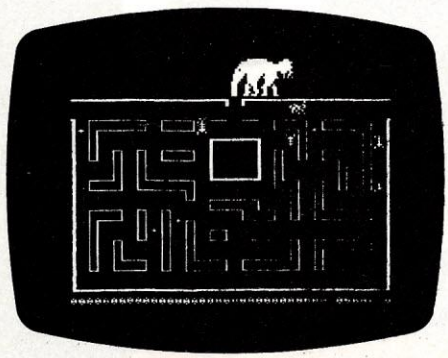
CIRCLE 317 ON READER SERVICE CARD

*Apple II and Applesoft are registered trademarks of Apple Computer Co.

Pac-Man. But the scenario is a fresh one.

You play the role of the White Ant, and your purpose is one familiar to students of biology—to perpetuate the species. You start the game with about 30 eggs, which represent your capacity to reproduce, at the bottom of the screen.

Arrayed against you are several adversaries. First, one ant each of the



four basic ant types—yellow, blue, green, and red—circulate around the maze, trying to devour you. Another natural enemy is the dreaded anteater, who strolls into the picture every so often and sticks his tongue into the anthill, sucking up friend and foe, ant and egg alike. Finally, periodically a rain shower turns the lower part of the anthill into a disaster area, minus the federal aid.

With the odds against her, the lone ant has little chance for survival. Fortunately, if she can find a safe place in the maze in which to lay an egg where it will not be eaten by another ant, after she is gone, the egg will hatch, and another white ant will take her place. Moreover, she has a weapon she can use.

The other ants are busy laying eggs also, and when she eats one of theirs, she begins to glow, letting you know that the next egg she lays will be deadly to the other ants, if laid directly in their path. At each level, play continues until the white ant is killed, without leaving any eggs in the maze, or until all four of the other ants have been killed without surviving offspring.

If the latter occurs, the game proceeds to the next level, and four new enemy ants come marching in to the tune of "When Johnny comes Marching Home" (which some like to think of as "The Ants Go Marching Two by Two").

Each maze has 99 levels of difficulty. If that fails to provide enough variation, there are six different maze configurations to try out.

Krazy Antiks rates a high score for playability. Even an experienced player can get caught early on by a freak accident, which inevitably leads to "just one more" game. There is a pause option, for those disturbed by the inconsiderate intrusions of friends and family. Unfortunately, there is no multi-player option. But if you don't mind going it alone, you'll bless the day when ant met Antic.

—*SL*

creative computing

SOFTWARE PROFILE

Name: K-razy Antiks
Type: Arcade
System: Atari 400/800 16K
Format: ROM cartridge
Language: Machine
Summary: Puts ants in your pants
Price: $39.95
Manufacturer:

CBS Software
Columbia Group, CBS Inc.
Hagerstown, MD 21740

METEOR STORM

MADE EXCLUSIVELY FOR THE *ATARI

24K Disk
16K Tape **$29.95**

Ask for Meteor Storm at your local computer store or order direct from us. Add $2.00 for shipping. Use your Visa, M/C.

METEOR STORM Is a FAST-ACTION, Arcade Quality, game. Written in machine language especially for the Atari. You, as the Pilot of a Fighter space ship, must rescue as many people from the besieged city of Dracon as you possibly can. You'll have to fight your way through a meteor storm and aliens, with your lasers blasting a path. Then you must dock with the mother ship and safely deliver your precious cargo of human lives. This is your chance to be the HERO of Dracon.

Royal Software

Dealer Inquiries Invited
*Atari is a Trademark of Atari Inc.

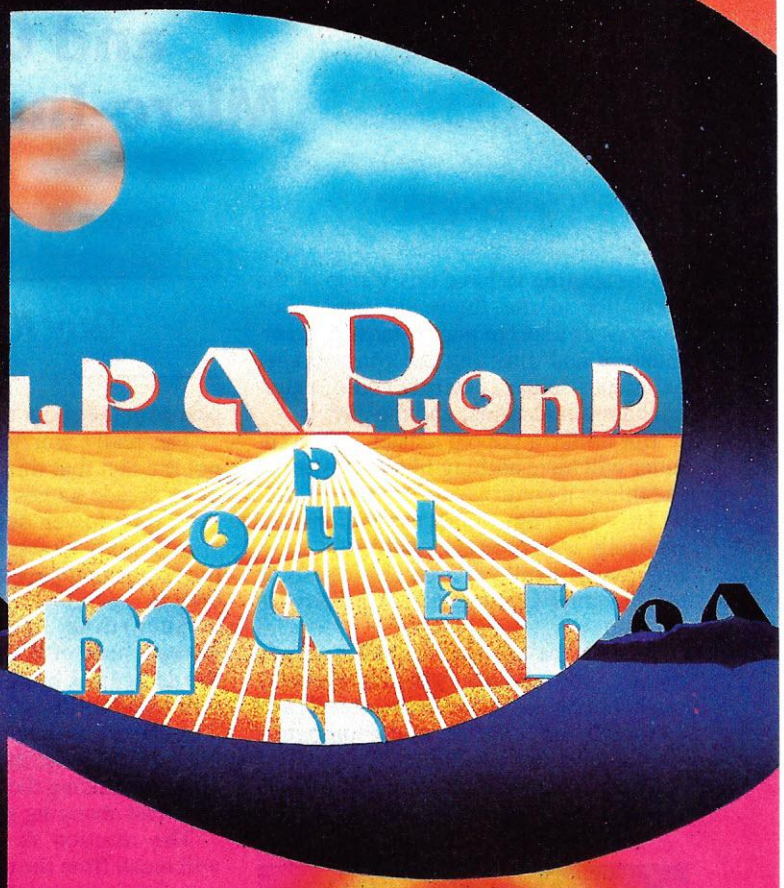
2160 West 11th Ave., Eugene, Oregon 97402
(503) 683-5361

CIRCLE 250 ON READER SERVICE CARD

PANDEMONIUM

By Norman J. Wazaney Jr.

A word game for our time.



At last... a computer word game that entertains, challenges, educates! Pandemonium is thoroughly fascinating, stimulating, and highly addictive.

Features include a built-in 6000 word dictionary, scoring display and a player selectable clock.

Play it alone! Play it with your kids! Play it at a party!

The word is out... Pandemonium is in. Available now for only $39.95 at computer stores.

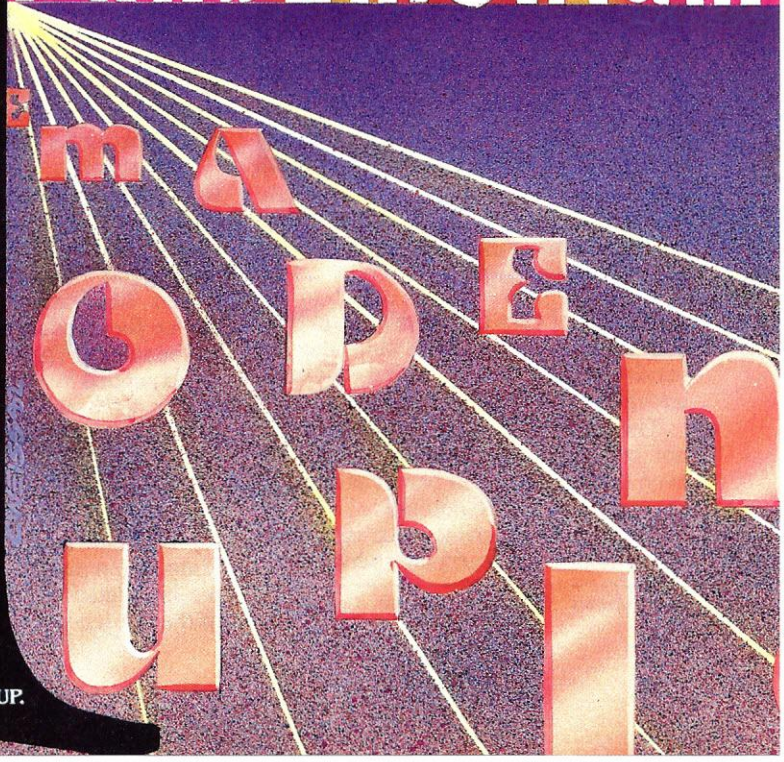
To order by phone, call 800-526-9042 and use your Visa or MasterCard. All shipments made the same day in which orders are received. To order by mail, add $1 for shipping charges and send your check to:

Soft images
DIVISION OF DECISION SYSTEMS INC
200 Route 17, Mahwah, NJ 07430.

TRS-80 MOD I/III 48K TRS-DOS
TRS-80™ Radio Shack/Tandy Corp.

48K Apple II, Applesoft in ROM, 3.3 DOS
Apple is a registered trademark of Apple Computer Co.

OUR SOFTWARE IS UNPROTECTED PERMITTING CONVENIENT BACK-UP.



CIRCLE 259 ON READER SERVICE CARD

Dragons, Acorns, and Other Micro-Innovations

Guy Kewney

I'm starting to have this vision of the computer of the future — one which shows it as a sort of puppet master, manipulating and directing external storage, external displays, external audio, external communications, and the like.

But unlike a puppet master, this computer will have nothing like the power of the things it controls.

This (perhaps unnecessary) philosophising was brought on by the most impressive display add-on I have seen, at the Personal Computer World Show in London.

In fact the device, called Pluto, is making me wonder whether graphics might not be just as versatile, useful, and profitable an area as microcomputers have shown they can be.

Pluto is a video plotter capable of drawing 100,000 pixels per second. It

The Pluto video plotter can draw 100,000 pixels per second. 16,000,000 colors is a bit of an exageration; 256 is more like it but still a lot.

uses 192K of very fast storage to do this, and has its own Intel 8088 chip (the one inside the IBM PC, the Digital Rainbow, and the Victor 9000) to control it.

The really interesting thing about it is not just the detail, nor the speed, nor even the fact that each pixel can have its choice of any of 256 colours.

It is the £600 sterling price tag which the little box was carrying, when it appeared at the show in London recently.

Guy Kewney, 38 Digby Crescent, London N4 2HR.

The really worrying thing about it is not the fact that this is less than the cost of an arcade games machine with a considerably lower screen precision and considerably slower computation — but the things that people are planning to do with it.

According to designer Graham Rowan, head of IO Research in London, the device has been keenly examined by writers of ordinary business software. They have, he says "all gone away talking rapidly about the things they plan to do by enhancing their business programs with fast changing graphics."

The reaction is one micro pioneers will recall from the days when we all saw our first microcomputer running Tiny Basic — the reaction which says "Hey, this isn't marvellous; it's useful!"

On top of that, Rowan has been approached by advertising graphics designers, CAD specialists, entertainers, and a wildly varying host of different types all united only in their conviction that this is what they have been looking for without knowing it.

In particular, a local company called Robocom is connecting its BitStik to the Pluto. BitStik is nothing more than a swanky games joystick, used to move a rectangular "frame" around a display screen. The frame can be enlarged, and can be focussed onto the smallest detail on the screen. Then, that small detail can be expanded to fill the whole screen. Again, the frame can be focussed on a small detail, and that detail enlarged.

The BitStik can be used to draw, to position pre-drawn details, and to position color fill. Coupled with the incredibly accurate and fast color display of Pluto, the potential for designers makes the integrated circuit design machinery of the last ten years look primitive.

So far it has been interfaced to most popular micros available here, and the designers say that adding a new machine is the work of a few weeks only.

Micronet 800

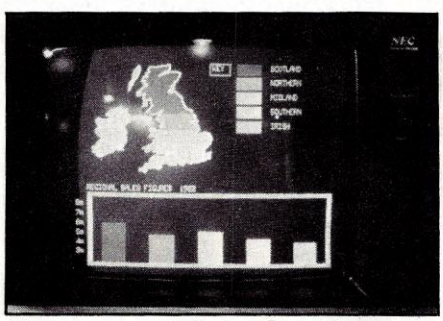
The other big step forward for visitors to the PCW Show, was the arrival of Micronet 800.

There is no relationship between Micronet in America, and Micronet 800 in Britain, other than the name and the fact that they are aiming to do the same thing — provide an information handling and forwarding utility.

The basis of the British scheme is the famous Prestel (now called Teletex in fashionable circles) network which British Telecom, the old Post Office, set up in vain hopes of turning the country's TV sets into terminals.

It has at last dawned on them that it is easier to turn a pretty smart computer into a teletex receiver/transmitter, than to use an ordinary domestic television as a data display/responder.

By joining forces with an enterprising local businessman called Richard Hease, the Prestel authorities may have brought their baby out of its birth coma at last. Hease has fingers in publishing, and in computer retailing, being the first distributor to be appointed by Clive Sinclair here. Normally, Sinclair restricts himself to selling through the mail, or a chain of stationery stores, W. H. Smith.



Pluto generated the image on the screen faster than you can read this caption.

At last... a better way to find that article on computing!

An indexing service to locate source material in specific subject areas.

LAMP is a bi-monthly index to approximately 100 computer publications. An outstanding feature is the Subject Index, cross-referenced to provide the most comprehensive listing and ease of retrieval. All articles are read for subject content and then listed with as many cross references as required to retrieve the article.

An Author Index lists individual names as well as each contributor in jointly written articles. Another section is the Review Index which covers book reviews, hardware, software and educational courseware. It lists the source of the review and translates the written review into a One-Star to Five-Star rating.

LAMP eliminates the hit or miss method of finding articles of interest to you. Each bi-monthly issue contains approximately 200 pages.

A year-end issue is cumulative and includes the information from the previous 5 issues. Send for your subscription today.

BONUS FOR CHARTER SUBSCRIBERS
Subscribe now for the inaugural issue to be published in January 1983 and receive the LAMP pilot program which indexed periodicals from June through October, 1982. In effect, 5 months of LAMP free for ordering now.

To order by phone, call 800-526-9042 and use your Visa or MasterCard.
To order by mail, send your check for $69.95 to Soft Images, 200 Route 17, Mahwah, N.J. 07430.

LAMP

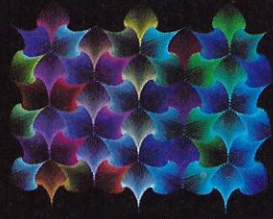
Literature Analysis of Microcomputer Publications

Soft images
DIVISION OF DECISION SYSTEMS INC.

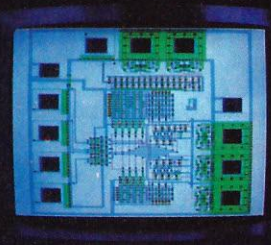
CIRCLE 319 ON READER SERVICE CARD

SUPERIOR GRAPHICS HAVE COME DOWN TO EARTH.

"Three Atoms" Courtesy of Greg Abram, University of North Carolina at Chapel Hill



"Aurora" By Richard Katz, Vectrix Corporation



"Integrated Circuit Design" Courtesy of Floyd J. James, University of North Carolina at Chapel Hill

"In The Beginning" By Richard Katz, Vectrix Corporation

$1995 AND THE FIRST AFFORDABLE HIGH RESOLUTION COLOR GRAPHICS MACHINE IS YOURS

VX128

• **VERY HIGH RESOLUTION** 672 by 480 pixels individually addressable

• **EIGHT COLORS PER PIXEL** 3 bit planes of memory totalling 128K graphics RAM

• **ON-BOARD 16 BIT MICRO-COMPUTER** Intel 8088 microprocessor with additional PROM and RAM and built-in expansion capability

• **3D GRAPHICS SOFTWARE PACK-AGE** built-in command set includes: rotation, scaling, translation, perspective, clipping, viewport, polygon, and filled polygon

• **HARDWARE LINE AND ARC GENERATION** on-board VLSI graphics display controller, 1600 nano-seconds pixel drawing time

• **SERIAL AND PARALLEL INTERFACE** 300-19.2K baud RS-232 and 8 bit parallel port

• **USER FRIENDLY COMMAND FOR-MAT** supports high level language and hexadecimal transmissions

VECTRIX

• **USER DEFINABLE CHARACTER GENERATION** built-in character set includes zoom, slant, and variable spacing, or upload your own character definitions

VX384

• **512 COLORS PER PIXEL** 9 bit planes of memory with 384K graphics RAM

• **COLOR LOOKUP TABLE** 8 bit digital-to-analog converters provide a 16 million color palate

• **INCLUDES ALL FEATURES** of VX128 for total of $3995

• **VXM HIGH RESOLUTION COLOR MONITOR** RGB analog input with 24 kiloHertz scan rate, long persistence phosphor $1295

• **COLOR GRAPHIC PRINTER** complete with interface cable $1295

For additional information on VX128, VX384, VXM Monitor or VXP Printer call Toll Free 1-800-334-8181, or 919-272-3479, or write Vectrix Corporation, 700 Battleground Avenue, Greensboro, NC 27401

CIRCLE 302 ON READER SERVICE CARD

His plan is to have a big database of free software, predominantly games, and to sell a £1 sterling per week subscription to owners of popular micros, which will enable them to use Prestel as their program storage area.

Any program held on Prestel can be downloaded, say the Micronet 800 people, in far less time than it takes from tape, and very reliably. The key to the scheme, of course, is the cost of connecting a computer to the phone.

The big breakthrough that Hease and his colleague Bob Denton hope will be ready for the official launch in January, is a £50 sterling modem plus interface, suitable for the Sinclair ZX81 and similarly cheap micros.

And for the bigger machines, they hope still to keep the hardware solution to around £100 Sterling.

If the plan works, and Micronet 800 manages to recruit the necessary 10,000 subscribers by June, Prestel will take one of its spare computers out of mothballs, where it has spent the last year waiting for the expected boom in teletex. Hease will then be able to start using the net-

Bob Denton of Micronet 800 aims to sign up 10,000 subscribers for £1 per week to download software, mainly games, from a huge central database.

work to sell business software on a "try it on the screen, order it through the network" basis. Electronic mail will be free after business hours, but profitable during peak time.

At the Show, Micronet 800 were demonstrating several simple software download routines, which actually appeared to work.

Acorn Econet

Even more impressive to the visitor, however, was the Acorn stand, where the maker of the BBC Microcomputer was demonstrating local networking.

Acorn's Econet was evolved in response to classroom needs — where one machine is useless, and simple multi-keyboard access even more so. Econet gives every Acorn processor (it makes two, the BBC and the Atom) access to a central file server with hard or floppy disks, and freedom to use an

Econet from Acorn allowed both Atom and BBC machines access to a central file server (left foreground) of hard or floppy disks.

area of that disk system as its own. In addition, it allows the file server to monitor each node, copy the screen at that node, and observe what system calls are being made. If necessary, the master system can be transferred to any node.

Best-seller of the show was an Acorn machine, the expanded Model B of the BBC micro. It was in plentiful supply, despite a chronic shortage of machines from Acorn. Where, asked angry users, were these machines coming from, when they had all been waiting up to nine months for their own models?

The answer, it seems, was that certain dealers who were out of patience with Acorn's slowness in building up volume production, had taken matters into their own hands. They had ordered the upgrade parts, paid money for the readily available Model A, and had done the conversion themselves.

This perfectly plausible explanation failed to satisfy many, who went about muttering about black markets and corruption in official circles. Others, more practically minded, switched their orders to a machine called the Dragon.

The Dragon

This was also selling well at the show, being essentially a Tandy Color Computer for £200 sterling. The machine is so essentially a color computer that it

The Dragon 32 is a British-made computer that is software compatible with the Tandy (Radio Shack) Color Computer.

will, if you take a color computer cartridge and file off the bumps, run most Tandy cartridge games.

It proves how wrong Tandy has been by being so reluctant to let anybody other than a Tandy store sell Tandy micros. Britain is sparsely supplied with the Texas company's outlets, and sales are proportionately lower than in the U.S. Everybody knows this, it seems, except Tandy, whose British executives resolutely insist that its products sell entirely on merit, and that distribution has nothing to do with it.

The Show

The show itself was a great success in its own right. People through the door were counted at over 50,000, making this the biggest micro show in the world now, and all that is really needed is a better venue.

EOS (Electronic Office Systems) had an immense stand (booth) at which they were showing an impressive array of hardware and software, mostly for the IBM PC.

The Barbican has space enough for the exhibitors, but not for the visitors — not surprising, as the building was put up as a multi-story car park, before it was discovered that there was more demand for exhibition space than car parking.

Organizers of the show still fail to arrange a trade-only day. Pressure from disgruntled exhibitors will certainly lead to that mistake ending next year.

Finding another venue, however, won't be so easy. It is a matter of dubious legality, but a rival exhibition organizer is able to prevent any other computer show besides its own from behing held at either Earls Court or Olympia stadia, under the terms of its contract with the hall owners.

The owners have a virtual monopoly of suitable sites in London. Until somebody with the money needed to challenge this monopoly in the courts steps forward, PCW must choose between London and comfort. And for the next year, at least, London will be the higher priority. □

Random Observations On Life In England

Telephones, Toilets and Car Parks

Betsy Staples

Last year in our report on the Personal Computer World Show we commented on, among other things, the showers and telephones in England. The showers haven't changed much, but here we bring you an update on phones and other items of interest to readers who want to learn about life beyond Harrods and the Inter-Continental.

This year, I, liberated, independent woman of the world that I am, flew to England alone, rented a tiny Ford Fiesta, and set off to see the countryside.

The few difficulties I had driving on the right side of the road were the result mainly of my preconceived terror. It wasn't bad at all. But then, I can't tell my left from my right, don't know which way faucets are supposed to turn, and have to think every time I unlock my front door.

I drove to Oxford and staggered into a 400-year-old inn with 6½′ ceilings and stairs of different heights. As I chatted with the proprietor, he suddenly lowered his voice to a confidential whisper and asked, "Why are you traveling alone? Did you have a fight?" I attempted to explain the situation to him, but should have been forewarned; it was a question I was to ask myself more than once in the coming days.

After spending a day each in Oxford, Bath, and Salisbury, I concluded that traveling alone is for people made of sterner stuff. It just wasn't fun, and I all but gave up eating, so distasteful did I find sitting alone in strange restaurants.

Parking the Car

Thanks to my rented car, I did discover an interesting British innovation that I had not noticed on previous trips: automatic car parks, as parking lots are called. The best kind provides a numbered card from the automatic card-spitter-outer at the gate. As you leave, you stop the car at a little check-out station right before the exit gate. You enter the number of your card through a membrane keyboard, the display flashes the amount you owe, you desposit the correct amount, the gate rises, and you drive away.

The other kind is similar to our metered lots, the main difference being that there are only three or four meters per lot or level. You park your car, walk to the nearest meter, set a dial for the amount of time you plan to stay, and deposit the indicated amount of money. A slip of paper with a bit of stickiness on the front emerges from the machine. You then return to your car and stick the paper to your windshield. I never saw anyone patrolling or checking these lots. I suppose they rely on the innate honesty of the British people.

It does strike me as strange that a country with such a high rate of unemployment which has failed to automate some of the lowliest functions known to man, would eliminate such a good source of low level jobs.

Cleaning the Toilet

And speaking of automation and low level jobs, there is in London at least one automatic toilet. David Tebbutt of Caxton Software took us (by this time I had met Dave Ahl in London) to the ultimate in modern sanitation right on the sidewalk in Soho Square. When you place the appropriate coins (about 10 pence, I think) in a slot in the shiny, white, cylindrical structure, a door slides open and you enter a (presumably) sanitary little rest room. When you are ready to leave, the door slides open, you exit, the door closes, and the whole interior (we were told) is hosed down, shaken up, or otherwise washed and sanitized.

There is only one catch. If you stay longer than 15 minutes, the cylinder concludes that something must be wrong, opens the door, and begins its cleaning cycle. Rumor has it that more than one unfortunate soul has been caught with his pants down.

Sanitizing the Phone

Sanitation, it seems, is something which is of great importance to the British people. For example, when was the last time you looked upon your telephone as a vector of disease? Not too recently, right?

Well, here is something to join Toxic Shock Syndrome, Extra Strength Tylenol and Copperheads in Northern New Jersey on the list of "Things We Never Had to Worry About Before": filthy phones.

The first time I saw the cheery Phonotas woman on a poster in an Underground station I thought it was a joke. "Keep your conversation clean!" she urged. "Call Phonotas to clean the whole phone!" Come now, they couldn't be serious.

So incredulous was I that I called the number given on the poster. A very earnest man answered and explained that the service was offered only to businesses and that he could not give me any idea of the cost until one of his representatives had visited our offices and made a thorough survey.

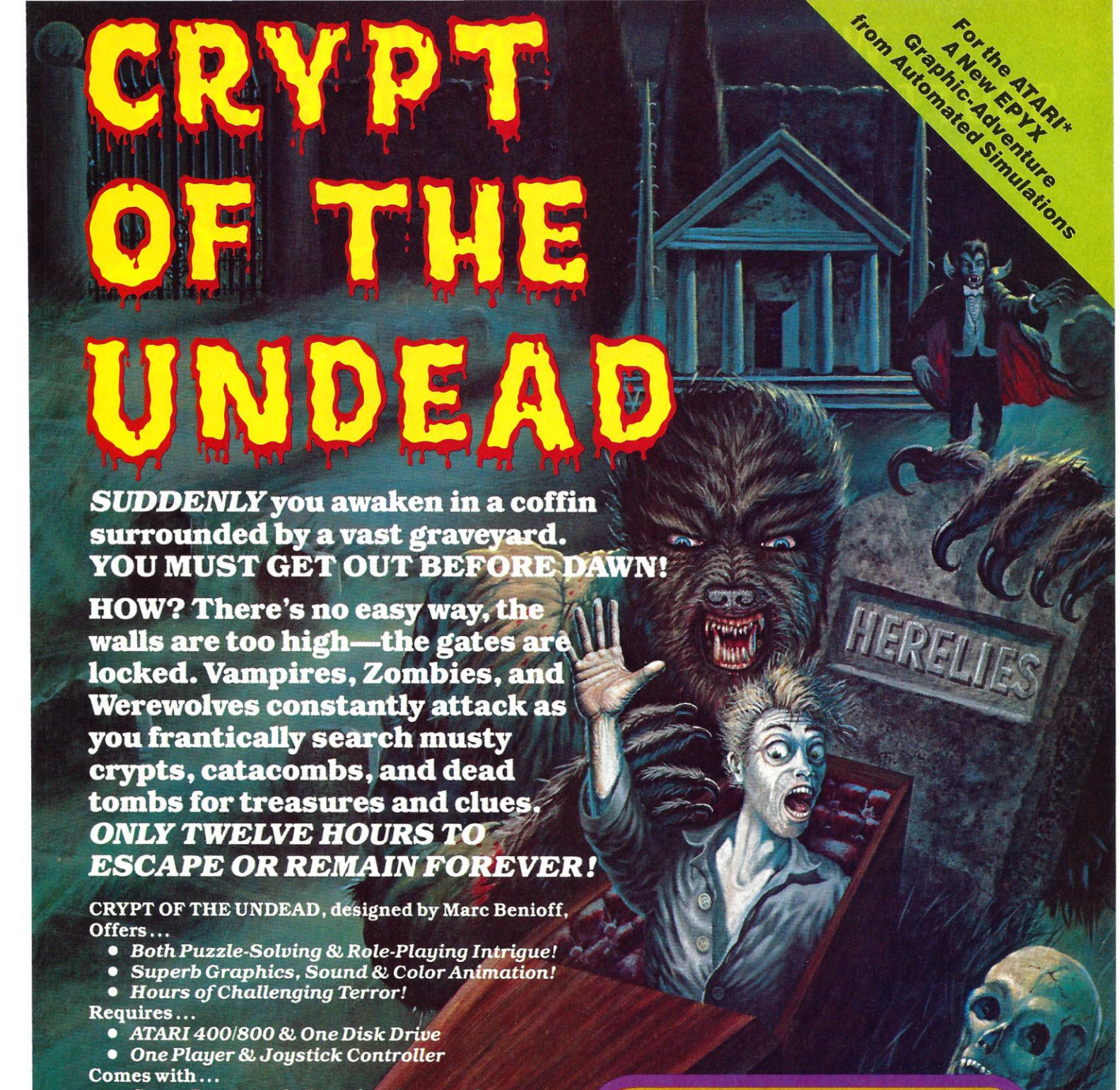
He explained further that Phonotas provides a uniformed cleaner who comes to your office weekly and "sanitizes the receiver against infection." The process takes about one minute per visit per phone "except, of course, the first time when it usually takes longer to get the phone up to scratch."

He asked for my address, promising that a salesperson would call within the week. I hadn't the heart to tell him my office was in Morris Plains, New Jersey, USA, so I mumbled something about calling back when my phone was dirtier and hung up.

My conclusion: the phones in England don't work any better than they did last year, but they must be cleaner. Perhaps that's what has become of all the former parking lot attendants — they have become phone cleaners.

CRYPT OF THE UNDEAD

For the ATARI* A New EPYX Graphic-Adventure from Automated Simulations



SUDDENLY **you awaken in a coffin surrounded by a vast graveyard. YOU MUST GET OUT BEFORE DAWN!**

HOW? There's no easy way, the walls are too high—the gates are locked. Vampires, Zombies, and Werewolves constantly attack as you frantically search musty crypts, catacombs, and dead tombs for treasures and clues. ***ONLY TWELVE HOURS TO ESCAPE OR REMAIN FOREVER!***

CRYPT OF THE UNDEAD, designed by Marc Benioff, Offers...

- *Both Puzzle-Solving & Role-Playing Intrigue!*
- *Superb Graphics, Sound & Color Animation!*
- *Hours of Challenging Terror!*

Requires...

- *ATARI 400/800 & One Disk Drive*
- *One Player & Joystick Controller*

Comes with...

- *Game Program & Complete Instructions*
- *EPYX 30/FOREVER WARRANTY*

Now Available At Your Favorite Dealer...$29.95
For the name of your nearest EPYX dealer write:
"CRYPT OF THE UNDEAD"
EPYX/Automated Simulations, Inc.
P.O. Box 4247, Mountain View, CA 94040

EPYX
COMPUTER GAMES THINKERS PLAY

EPYX Temple of Apshai was the very first computer game ever to win the Hobby Industry award for excellence. EPYX pledges you that same excellence in every game you purchase from us ... the VERY BEST in entertainment!

EPYX 30/FOREVER WARRANTY

*Our 30-day Unconditional Guarantee: If your EPYX Game has any defect whatsoever within 30 days of purchase, return it to us or your dealer and we will replace it free.

*Our Forever Warranty: If anything happens to your disk at any time after 30 days, for any reason, just send it back with $5.00 for shipping, and we will send you a replacement.

*ATARI 400/800 is a trademark of ATARI, INC.

CIRCLE 117 ON READER SERVICE CARD

WHEN YOU SIT DOWN TO A SCOTT ADAMS' GRAPHIC ADVENTURE . . .

. . . ANYTHING CAN HAPPEN!

That's right — anything can happen, and it usually does! Because with a Scott Adams Graphic Adventure, the fantastic is as close as your computer — and your own fertile imagination. Each S.A.G.A. features the finest in hi-resolution graphics — graphics which compliment and enhance the classic text — and, they can be toggled on or off with a single keystroke, too. Plus, optional Votrax Type 'N Talk™ and printer compatibility give you the flexibility to add new dimensions to your Adventuring — when you're ready.

The incomparable S.A.G.A. Series — experience the magic yourself. But be prepared for anything.

CIRCLE 103 ON READER SERVICE CARD

Also, look for the Scott Adams Text Adventure Series on these fine computers:
TRS-80 • COMMODORE VIC • NEC PC-8001
TEXAS INSTRUMENTS 99/4 • CP/M Z-80

S.A.G.A. #1 — Adventureland (Skill Level: Moderate)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0201	$39.95
ATARI 48K Disk	052-0201	$39.95
S.A.G.A. #2 — Pirate Adventure (Skill Level: Beginner)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0202	$39.95
ATARI 48K Disk	052-0202	$39.95
S.A.G.A. #3 — Mission Impossible (Skill Level: Advanced)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0203	$39.95
ATARI 48K Disk	052-0203	$39.95
S.A.G.A. #6 — Strange Odyssey (Skill Level: Moderate)		
APPLE 2 PLUS 48K Disk (DOS 3.3 req.) . .	042-0206	$39.95
ATARI 48K Disk	052-0206	$39.95

PRICES SUBJECT TO CHANGE

Adventure INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

The Third European Microcomputer Chess Tournament

Anthony Harrington

The Third European Microcomputer chess tournament, held at the Barbican Centre during the PCW exhibition, September 9-12, 1982 proved once again that computer chess is a thriving force.

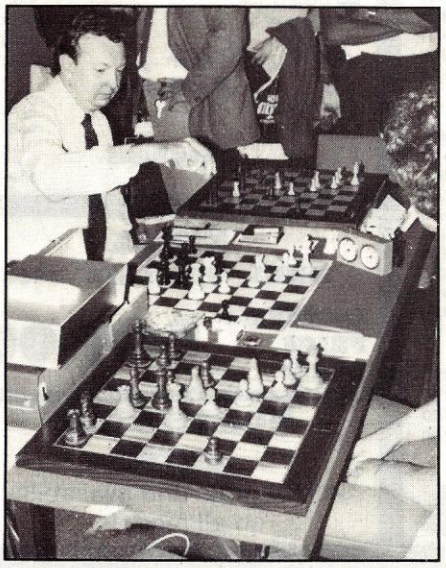
A seven-round Swiss tournament is always an exciting affair with something of a lottery about it. The basic rule of such a tournament, for those who are unfamiliar with Swiss events, is that winners play winners and losers play losers. Each time the draw is made for a new round, the tournament director tries to pair opponents with the same scores against each other.

Because of this, the going gets easier for the weaker players (programs in this instance) and more and more difficult for those who are doing well. It is a sure way of finding the strongest player/program in the tournament. And it produces some marvellous final rounds.

This year's concluding round was in a class by itself, with the eventual overall winner, Mark Johnson and David Wilson's Advance 2.4, saving its unbeaten record at the last moment by a quirk of fate peculiar to computer chess.

But more of that final round later. Like all chess tournaments, even the human kind, this event began long before any processors found their way into the playing hall in the Barbican Centre.

This year there was an added complication to the usual organisational difficulties that surround such an event. Six months before the tournament was due to begin *PCW* changed hands. Bunch Books, the former owners of *PCW*, who staged the first European tournament back in 1978, sold the magazine to VNU Publications, a Dutch publishing group.



The prototype chessboard for the German machine Bogol (foreground) was built by an excellent craftsman who knew nothing about chess (note the white square in the bottom left corner). Here it is playing against La Regence from David Levy's Intelligent Software Company, the eventual commercial victor.

On top of this change, David Levy, the international chess master, and the man responsible for orgainising the tournament in previous years, decided, quite rightly, that his commercial interests in computer chess programs made it impossible for him to continue to organize the event.

The upshot of all this was that invitations and entry forms went out on short notice, a month before the tournament was due to start. Nevertheless, the tournament attracted a very strong field, totalling 14 entries in all. This was two more than last year, though program failure in the case of two entrants meant that the numbers actually contesting the tournament turned out to be identical.

Commercial Entries

The final line-up included four commercial entries (programs or dedicated chess computers actually on sale to the public or which would be available before the end of the year) and four experimental entries from commercial companies.

It might have been even stronger, but Fidelity, of Miami, FL, whose Sensory Chess Challenger 9 is one of the strongest chess computers around, decided against entering a week before the start. (According to John Renaldo, Fidelity's marketing manager they were considering entering either a commercial model or an experimental entry or both.)

The West German company Hegener and Glaser, who make the Mephisto, also almost entered, but decided at the

Anthony Harrington, 81 Hornby Rd., Brighton, England.

computer mail order west

ATARI

400

16K..... $269
32K..... $349
48K..... $429

410 Recorder	$ 76.00
810 Disk Drive	$449.00
822 Printer	$269.00
825 Printer	$589.00
830 Modem	$159.00
820 Printer	$259.00
850 Interface	$169.00
CX40 Joysticks (Pair)	$ 18.00
CX853 Atari 16K Ram	$ 77.95

800 — 48K

~~$Dog~~ call

Microtek 16K Ram	$ 74.95
Axlon Ramdisk (128K)	$429.95
Intec 48K Board	$159.00
Intek 32K Board	$ 74.00
One Year Extended Warranty	$ 70.00
CX481 Entertainer Package	$ 69.00
CX482 Educator Package	$130.00
CX 483 Programmer Package	$54.00
CX 484 Communicator Package	$344.00
Atari 800 Dust Cover	$6.99
Atari 400 Dust Cover	$6.99
Atari 810 Dust Cover	$6.99

PERCOM

Disk Drives For Atari Computers

S1 Single Drive	$589.00
A1 Add-on Drive	$339.00
S2 Dual Drive	$879.00
Single Side Dual Head	$679.00
Dual Drive Dual Head	$1046.00

μ-SCI

MICRO-SCI Disk Drives For Franklin & Apple

A2	$319.00
A40	$369.00
A70	$499.00
C2 Controller	$79.00
C47 Controller	$89.00

ATARI

Pac Man	$35.00
Centipede	$35.00
Caverns of Mars	$32.00
Asteroids	$29.00
Missile Command	$29.00
Star Raiders	$35.00

DATASOFT

Pacific Coast Highway	$25.00
Canyon Climber	$25.00
Tumble Bugs	$25.00
Shooting Arcade	$25.00
Clowns and Balloons	$25.00
Graphic Master	$30.00
Graphic Generator	$13.00
Micro Painter	$25.00
Text Wizard	$89.00
Spell Wizard	$64.00
Bishop's Square	$25.00

ON-LINE

Jawbreaker	$27.00
Softporn	$27.00
Wizard and the Princess	$29.00
The Next Step	$34.00
Mission Asteroid	$22.00
Mouskattack	$31.00

SYNAPSE

File Manager 800	$79.00
Chicken	$26.00
Dodge Racer	$26.00
Synassembler	$30.00
Page 6	$19.00
Shamus	$26.00
Protector	$26.00
Nautilus	$26.00
Slime	$26.00
Disk Manager	$24.00

K-BYTE

Krazy Shoot Out	$32.00
K-razy Kritters	$32.00
K-razy Antics	$32.00
K-star Patrol	$32.00

STICK STAND $6.99

VISICORP

For Apple, IBM, Franklin

Visidex	$189.00
Visifile	$189.00
Visiplot	$159.00
Visiterm	$189.00
Visitrend/Plot	$229.00
VisiSchedule	$229.00
Desktop Plan	$189.00
VISICALC for Apple II plus, Atari, CBM & IBM	$179.00

Continental

The Home Accountant (Apple/Franklin)	$59.00
The Home Accountant (IBM)	$119.00
1st Class Mail	$59.00

FLOPPY DISKS

Maxell

MD I (Box of 10)	$36.00
MD II (Box of 10)	$46.00
MFD I (8")	$44.00
MFD II (8" Double Density)	$54.00

Verbatum

5 1/4" SS DD	$26.00
5 1/4" DS DD	$36.00

Elephant

5 1/4" SS DD	$19.99

TIMEX

TIMEX SINCLAIR 1000

LOWEST PRICE EVER! $89.00

NORTH STAR ALTOS

Call for price and availability on all models.

MODEMS

Hayes

Smart	$239.00
Smart 1200 (1200 baud)	$549.00
Chronograph	$199.00
Microdem II	$279.00
Microdem 100	$309.00

Novation

Cat	$144.00
D-Cat	$159.00
Auto Cat	$219.00
212 Auto Cat	$589.00
Apple Cat II	$339.00
212 Apple Cat II	$609.00

Anchor

Mark I (RS-232)	$79.00
Mark II (Atari)	$79.00
Mark III (TI-99)	$109.00
Mark IV (CBM/PET)	$125.00
Mark V (OSBORNE)	$95.00
Mark VI (IBM-PC)	$179.00
Mark VII (Auto Answer/Dial)	$119.00
9 Volt Power Supply	$9.00

MONITORS

AMDEK

300G	$169.00
Color I	$339.00
Color II	$699.00
Color III	$429.00

BMC

12" Green	$ 85.00
13" Color 1400	$279.00
13" Color 1401 (Mid Res)	$369.00

ZENITH

ZVM 121	$ 99.00

SHARP

Sharp 13" Color TV	$275.00

PANASONIC

TR-120 MIP (High Res. Green)	$159.00
CT-160 Dual Mode Color	$299.00

west 800-648-3311 west

IN NV. CALL (702) 588-5654

P.O.BOX 6689 STATELINE, NV. 89449

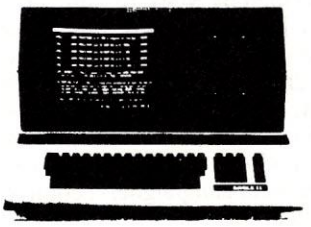
In-stock items shipped same day you call. No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the continental United States with no waiting period for certified checks or money orders. Add 3% (minimum $3.00) shipping and handling on all C.O.D. and Credit Card orders. NV and PA residents add sales tax. All items subject to availability and price change. **NOTE:** We stock manufacturer's and third party software for most all computers on the market! Call today for our new catalogue.

computer mail order east

FRANKLIN ACE1000

64K Personal Computer
Hardware, Software and peripheral compatable with the Apple II and even has some features not found on the Apple.

EAGLE COMPUTER



64K RAM
780 KB Disk Storage
Word Processing, Ultracalc CP/M, CBasic Software
Smith Corona TP1 Letter Quality Printer

Retail Value $4895.00

Our Price **$2995.00**

commodore

8032	$999.00
CBM 64	CALL
4032	$749.00
8096 Upgrade Kit	$369.00
Super Pet	$1599.00
2031	$369.00
8250 Double Sided Disk Drive	$1699.00
D9060 5 Megabyte Hard Disk	$2399.00
D9090 7.5 Megabyte Hard Disk	$2699.00
8050	$1299.00
4040	$969.00
8300 (Letter Quality)	$1549.00
8023	$599.00
4022	$399.00
New Z-Ram. Adds CP/M and 64K Ram	$549.00
The Manager	$209.00
Magis	CALL
Word Pro 5 plus	$319.00
Word Pro 4 plus	$299.00
Word Pro 3 plus	$199.00
The Administator	$379.00
InfoPro Plus	$219.00
Power	$79.00
VIC 20 Dust Cover	$6.99
CBM 8032 Dust Cover	$14.99
CBM 8050/4040 Dust Cover	$10.99

HEWLETT PACKARD

HP•85 $1969

HP-125	$1969.00
HP-85 16K Memory Module	$169.00
5 1/4" Dual Master Disk Drive	$1799.00
Hard Disk w/ Floppy	$4349.00
Hard Disk	$3549.00
"Sweet Lips" Plotter	$1199.00
80 Column Printer	$649.00

IBM® PC

Call...
for price and availability on IBM-PC hardware, soft ware and peripherals.

NEC 3550 Printer (for IBM)	$2099.00

VIC 20 $179

VIC 1530 Commodore Datassette	$69.00
BIC 1540 Disk Drive	$339.00
VIC 1541 (64 Disk Drive)	CALL
VIC 1525 Graphic Printer	$339.00
VIC 1210 3K Memory Expander	$32.00
VIC 1110 8K Memory Expander	$53.00
16K VIC Expansion	$94.00
VIC 1011 RS232C Terminal Interface	$43.00
VIC 1112 VIC IEEE-488 Interface	$86.00
VIC 1211 VIC 20 Super Expander	$53.00
VIC Mother Board	$99.00

HEWLETT PACKARD HP 41CV CALCULATOR $209

HP 41C	$149.00
HP 10C	$69.00
HP 11C	$79.00
HP 12C	$114.00
NEW 115C	$109.00
NEW 16C	$114.00

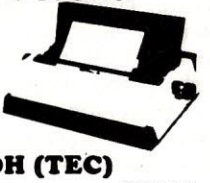
HPIL PERIPHERALS IN STOCK!

Televideo Terminals

910	$579.00
912C	$699.00
920C	$749.00
925C	$749.00
950	$950.00
800A	$1319.00
802	$2649.00
802H	$4695.00
806	$5795.00
816	$9495.00

PRINTERS

Smith-Corona TP-1 $599



C.ITOH (TEC)

Starwriter (F10-40CPS)	$1399.00
Printmaster (F10-55CPS)	$1749.00
Prowriter 80 Col (P)	$499.00
Prowriter 80 Col (S)	$629.00
Prowriter 2 (132 Col)	$799.00

Okidata

82A	$429.00
83A	$659.00
84P	$1079.00
84S	$1199.00

IDS

132 (fully configured)	$1599.00
80 (fully configured)	$1399.00

Call for other configurations

Daisywriter

Letter Quality	$1049.00

SHARP PC-1500 POCKET COMPUTER

ALSO AVAILABLE:
Printer w/cassette interface
cassette tape recorder
and 4K and 8K RAM EXTENSIONS

NEC COMPUTERS

8001-A	$749.00
8031	$749.00
8012	$549.00

Printers

8023	$549.00
7710/7730	$2399.00
3510/3530	$1599.00

Monitors

JB-1201	$159.00
JC-1201	$329.00
JC-1202	$899.00

east 800-233-8950

IN PA. CALL (717) 327-9575

477 E. THIRD ST., WILLIAMSPORT, PA. 17701

In-stock items shipped same day you call. No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the continental United States with no waiting period for certified checks or money orders. Add 3% (minimum $3.00) shipping and handling on all C.O.D. and Credit Card orders. NV and PA residents add sales tax. All items subject to availability and price change. **NOTE:** We stock manufacturer's and third party software for most all computers on the market! Call today for our new catalogue.

CIRCLE 141 ON READER SERVICE CARD

last moment that they didn't like Swiss tournaments and would concentrate instead on the US World Championships in March 1984.

One has to sympathize with commercial companies. They have a lot at stake as far as potential sales are concerned. And if their machine, for some reason, fails to win one of the top three placings in a tournament it is tempting for their managing directors to feel that the public will take the hint, and buy the machine which did better.

My own feeling here is that they would do better to compete. If they do feel their commercial model is a little delicate, there's no harm in entering an experimental version. It would give their programmers a chance to test their ideas, and the results wouldn't affect their market share, provided the name given to the experimental entry bore no relation to the market model.

Still, if one remembers that the commercial class in the World Championships, held at Lübeck-Travemünde, West Germany, in September last year, consisted of only four entries, one of which withdrew after a few rounds, the commercial line up wasn't bad. And the amateur entries were excellent.

Amateur Entries

It is the amateur entries that make these events. Unburdened by the financial anxieties of the commercial entrants, the amateurs give the tournament its enthusiastic, convivial atmosphere. Whereas commercial competitors have a tendancy to get a little grim at the board and to be sharp and short with opponents, the amateurs tone down the seriousness of it all — and are just as willing to laugh at the odd strange move generated by their own program as they are at their opponent's.

In all there were five amateur entries. From Hamburg, Dieter Steinwender, a computer science student, led a team of four German students with an entry called Micromurks, running on an Apple II.

Also on an Apple II was White Knight (Mk 10), written by Mark Bryant. This, like Richard Lang's Cyrus II, running on an Osborne, was an improved version of a program entered into last year's PCW tournament. Mark Johnson and Dave Wilson, with Advance 2.4 and Jeff Cooper with Chess '86, also seasoned PCW tournament campaigners, completed the amateur turnout.

In passing, one should probably say that the "amateur status" of several of these programmers simply means that they are not selling or about to sell their entry programs, (though they might, if an offer came along). Johnson, Bryant, and Lang are all employed by Intelligent software, a company set up by David Levy and Kevin O'Connell to write and market chess programs (and other intelligent games).

Spectrum Chess from Arctic for the Sinclair ZX81 held its own against much more powerful competitors such as Sci Sys' MK 5.01 experimental entry (foreground).

Experimental Entries

In the experimental commercial class (programs which won't go before the public in their present form), there were two entries by SciSys, the Hong Kong based company whose machine, Mark V, won the Travemünde world championships. These were the Mark 5.01 Experimental and the President Turbo Experimental. The Austrian chess programmer Wim Rens, sponsored by the UK firm Microtrend entered a program called Gambeit '86, and Intelligent Software put in an entry called Philidor.

The commercial section proper, consisted of La Regence, a "sensory-board" chess computer designed by Intelligent Software; another sensory-board machine, called Bogol, by the Hamburg company Omikron (a newcomer to the commercial chess machine market); Spectrum Chess, which runs on the ZX Spectrum, designed by Arctic Computers; and an Irish entry, Conchess, another sensory-board machine.

On the morning of September 9 the competitors assembled in the playing area in the Barbican Centre, set up their machines and programs and promptly experienced the first (and, thankfully, the last) major delay of the event. Someone had wired up a plug incorrectly and blew the fuse for that entire floor sector of the Barbican exhibition hall.

Bear in mind the fact that the tournament was part of the PCW micro exhibition and hundreds of micro suppliers were putting the finishing touches to their stands while we were hunting for an electrician and you will get a fair picture of the start conditions.

Round One

Finally, after a half-hour delay an electrician was found to fix the fault and uncover the culprit, who shall be nameless, and the first round began. The draw and results for the first round are shown in Figure 1.

Play for the whole of this tournament was at the rate of two minutes a move, with the first time control at 30 moves in the first hour and then 23 moves in 46 minutes. This is a somewhat faster rate than is usual in tournament play, but it was forced on us by the tight closing hours of the exhibition.

Doors opened for the players and exhibitors at 9:00 a.m., (10:00 a.m. for the public), and closed at 7:00 p.m. In order to get through two games a day, we had to limit each round to approximately 3½ hours.

Players were allowed a maximum of 30 minutes down time to rectify any program crashes, so the possible duration of each round was 4½ hours. Since the theoretical starting time for the morning

Figure 1. Draw and results, Round One.

Advance 2.4	½	Philidor	½
Spectrum Chess	0	Cyrus II	1
La Regence	1	Chess '86	0
Gambeit '82	0	President Turbo	1
Conchess	1	Mk. 5.01 Exp.	0
Micromurks	0	White Knight	1
Bogol	0	(Default)	

Great Plains Accounting/Management Software

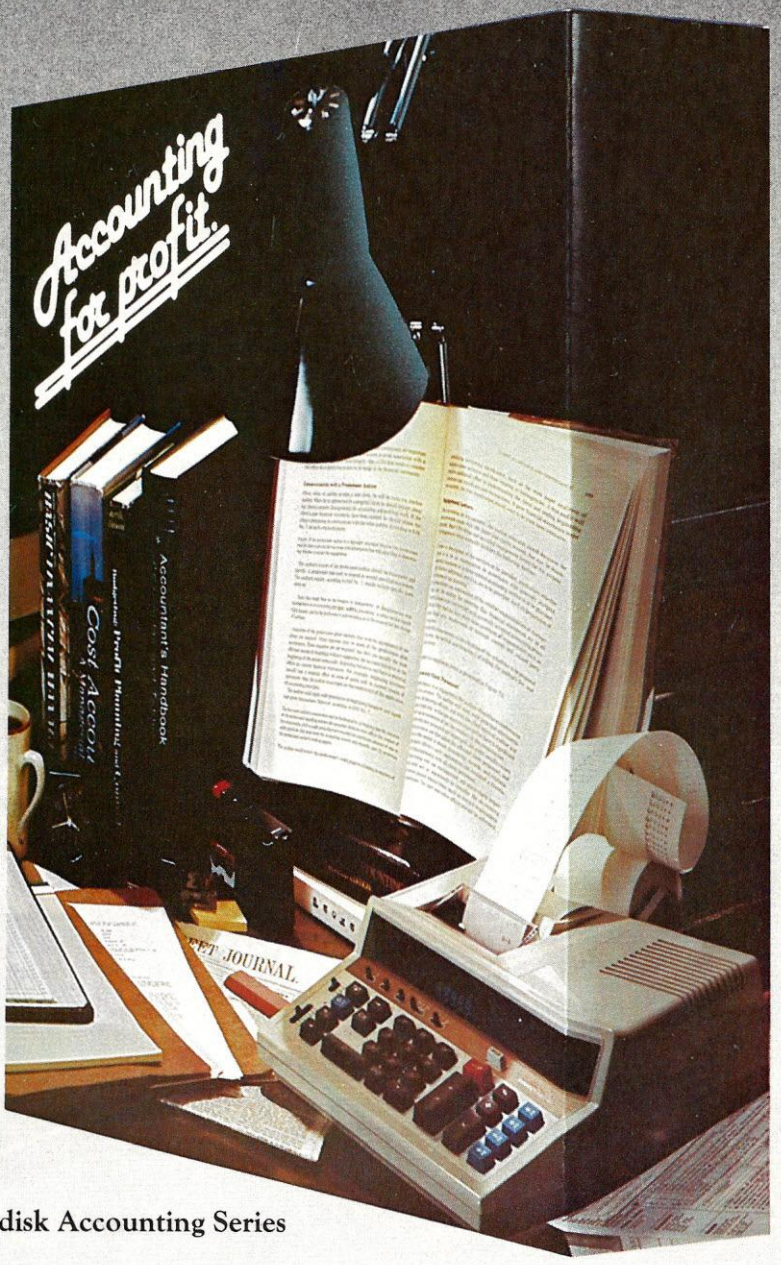
ACCOUNTING FOR PROFIT

Most business people know that there are two ways to improve business profits: sell more or spend less. The Hardisk Accounting Series from Great Plains Software does both. And your profits will never be better!

Great Plains Software improves business profits because it accounts for them. Your profit centers are isolated and unnecessary losses are avoided – whether you're using General Ledger, Accounts Payable, Accounts Receivable, Payroll or Inventory with Point-of-Sale.

The Hardisk Accounting Series is fast, powerful and operates on popular microcomputers. Don't trust your company's profits to any software other than Great Plains Software. When it's time to see profits, the Hardisk Accounting Series is accountable!

Call or write your local computer store dealer or Great Plains Software for more information on how you can account for your profits!



Hardisk Accounting Series

SPECIFICATIONS

OVERALL
- Password Privacy System
- Written in UCSD Pascal **
- Hard Disk Oriented
- Operates on Apple III, IBM PC

GENERAL LEDGER
- All entries on line entire fiscal year
- Flexibly formatted financial statements
- Comparative income statements and balance sheets

ACCOUNTS RECEIVABLE
- Up to 32,768 customers*
- Profit by customer, customer type, salesman and state
- Open item or balance forward
- Automatically posts to G/L

ACCOUNTS PAYABLE
- Up to 32,768 vendors*
- Accommodates manual or generated checks
- Automatically posts to G/L

PAYROLL
- Up to 32,768 employees*
- Up to 25 deductions per employee
- Withholding computed
- Prints W2, 941 and checks

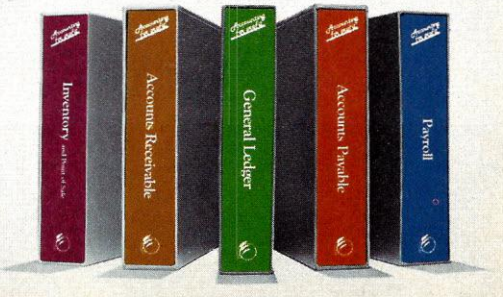
INVENTORY
- FIFO, LIFO, standard cost, weighted moving average and serial number valuation
- 5 price levels per part
- Concise report including profit by part and line
- Point of Sale for cash and credit sales
- Part numbers up to 15 characters
- Automatically posts to A/P and A/R

**depending upon disk storage space*
***TM UC Regents*

GREAT PLAINS SOFTWARE

123 15 Street N., Fargo, ND 58102
Telephone (701) 293-8483

CIRCLE 179 ON READER SERVICE CARD



If flying your IBM® PC got any more realistic, you'd need a license.

You took off from Boston-Logan with nothing above you but blue sky. Now you're 5,000 feet over Long Island Sound, and New York-La Guardia, your destination airport, reports high winds. Connecticut-Bridgeport is the logical alternate, but clouds with a low ceiling are going to make life difficult. You're in for an instrument approach...

The plane inside your PC. Run the Microsoft® Flight Simulator on your IBM Personal Computer, and put yourself in the pilot's seat of a Cessna 182. You control everything from flaps and ailerons right down to the magneto switch. You can even navigate using radio signals and fly totally by instruments if you run into bad weather. Best of all, Flight Simulator features a full-color, out-the-window flight display. With detailed graphics that closely simulate a pilot's actual perspective.

The world beneath your fingers. Once you're in flight, don't worry about running out of airspace. You can take off and land at over 20 airports from Los Angeles to New York. Each, with its own particular set of challenges.

The learning curve. In its "easy" mode, the Flight Simulator gives new pilots an aircraft which readily forgives errors in flight, engine control, and navigation. As you gain skill, move into "reality" mode. Then get ready for simulations of everything from running out of fuel to carburetor icing.

The Ace in your soul. When you think you've earned your wings, turn the clock back for a round of "British Ace." Fly into a World War I air battle complete with scouting flights, bombing runs and hair-raising dogfights. Destroy your targets, shoot down the enemy fighters, and you just might survive to be decorated.

Throttle on. Take a test flight at your computer store or software dealer. Once you've been aloft, you'll want to buckle up behind your own IBM PC with the Microsoft Flight Simulator. It's the closest you can get to flying. Without leaving your nest.

BETTER TOOLS FOR MICROCOMPUTERS

MICROSOFT™

MICROSOFT CORPORATION
10700 NORTHUP WAY
BELLEVUE, WASHINGTON 98004

Microsoft is a registered trademark and the Microsoft logo is a trademark of Microsoft Corporation
IBM is a registered trademark of International Business Machines Corporation

CIRCLE 208 ON READER SERVICE CARD

Figure 2. Draw and results, Round Two.

Cyrus II	(1)	1/2	Conchess	(1)	0
President Turbo	(1)	0	La Regence	(1)	1
White Knight	(1)	0	Advance 2.4	(1/2)	1
Philidor	(1/2)	0	Bogol	(0)	1
Mk 5.01 Exp.	(0)	1/2	Micromurks	(0)	1/2
Chess '86	(0)	0	Gambeit '82	(0)	1
A.N. Other	—	1/2	Spectrum Chess	(0)	1/2

Figure 3. Draw and results, Round Three.

La Regence	(2)	1	Cyrus II	(2)	0
Bogol	(1)	0	Advance 2.4	(1 1/2)	1
Conchess	(1)	0	President Turbo	(1)	1
Gambeit '82	(1)	0	White Knight	(1)	1
Spectrum Chess	(1/2)	0	Mk. 5.01 Exp	(1/2)	1
Micromurks	(1/2)	0	Philidor	(1/2)	1

Figure 4. Draw and results, Round Four.

Advance 2.4	(2 1/2)	1	La Regence	(3)	0
Cyrus II	(2)	1	President Turbo	(2)	0
White Knight	(2)	1/2	Mk 5.01 Exp	(1 1/2)	1/2
Philidor	(1 1/2)	1	Conchess	(1)	0
Bogol	(1)	1	Gambeit '82	(1)	0
Spectrum Chess	(1/2)	1	Micromurks	(1/2)	0

round was 10:00 a.m., and for the afternoon round, 2:30 p.m., a little mental arithmetic will tell you it was a close squeeze fitting both rounds in.

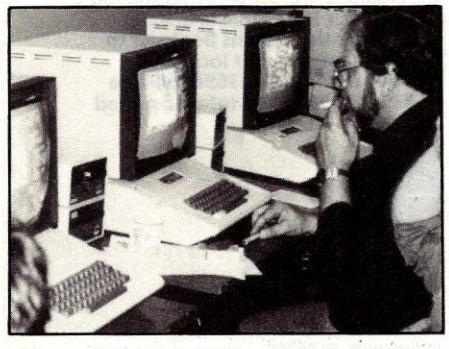
Because of the time pressure, it was decided to adjudicate all unfinished games at move 53. This set the tournament director, Stuart Reuben, some complicated adjudication problems in the course of the four days.

This first round was characterised by two events that looked more like absences than things that would shape the outcome of the tournament. Advance 2.4, running on a home constructed bit-slice machine found itself playing the white side of what must be one of the most boring Benoni defenses of all time.

Philidor, the opposing program constructed a blocked middle game in which the best either computer could think of doing was to shuffle rooks back and forth. The programmers read the papers while waiting for the inevitable draw by repetition. Fortunately Advance 2.4 went on to win the next five games in a row, in more aggressive fashion.

While this was going on, the Omikron team of Martin Suhl and Gerd Krey were busy missing the first round. Unfamiliar with London traffic, they'd made the mistake of taking a taxi from Oxford Street instead of a tube. Their program, Bogol went on to win four out of the remaining six games, and who knows, win in this opening round might have seen them draw level for top commercial entry with La Regence on 5 points.

The Second Round draw and results are shown in Figure 2.



Along with the 3rd Microcomputer Chess Tournament at the PCW Show, the Computer Scrabble Tournament proved popular with participants and spectators alike.

Figure 5. Draw and results, Round Five.

Advance 2.4	(3 1/2)	1	Cyrus II	(3)	0
La Regence	(3)	1	White Knight	(2 1/2)	0
President Turbo	(2)	1	Philidor	(2 1/2)	0
Mk 5.01 Exp	(2)	0	Bogol	(2)	1
Gambeit '82	(1)	1	Spectrum Chess	(1/2)	0
Micromurks	(1/2)	1/2	Conchess	(1/2)	1/2

Figure 6. Draw and results, Round Six.

President Turbo	(3)	0	Advance 2.4	(4 1/2)	1
Bogol	(3)	0	La Regence	(4)	5
Cyrus II	(3)	0	Mk 5.01 Exp	(2)	1
Conchess	(1 1/2)	1	White Knight	(2 1/2)	0
Philidor	(2 1/2)	1	Spectrum Chess	(1 1/2)	0
Micromurks	(1)	1	Gambeit '82	(2)	0

As the keen-eyed will have noted, the tournament had 13 entrants at this stage, though this was soon reduced to even figures for most of the tournament. Chess '86 collapsed during its game against Gambeit '82 and Jeff Cooper only managed to rectify it in time for the final round.

The day was exceptionally warm and the Barbican Centre was attracting record crowds. Computers don't like heat and several of them began to show their dislike. One of the SciSys entries, President Turbo overheated in a complex middle game against La Regence. It was a miracle that the President Turbo started the tournament at all, as Andrew Page, the SciSys UK general manager only received the module late the previous evening by airmail from Hong Kong.

Ideally, he would have liked a few weeks to test the program before the tournament, and we had to admire the competitive spirit that chose to enter rather than withdraw under such circumstances.

Later Rounds

Round Three draw and results are shown in Figure 3.

Richard Lang won last year's tournament and his program, Cyrus II had looked good up to this point. But La Regence proved too strong. Dieter Steinwender and the German team were becoming very disappointed with their program, which was showing definite flaws.

Round Four produced one of the key games of the competition.

La Regence put up a dour struggle against Advance 2.4, and the game went to the 53 move adjudication but Advance 2.4 was two clear connected passed pawns up in a rook ending and Stuart Reuben had no hesitation in awarding it a win.

Figure 7. Draw and results, Round Seven.

Mk 5.01 Exp	(3)	1/2	Advance 2.4	(5 1/2)	1/2
La Regence	(5)	0	Philidor	(3 1/2)	1
Bogol	(3)	1	President Turbo	(3)	0
Cyrus II	(3)	0	Micromurks	(2)	1
White Knight	(2 1/2)	1	Spectrum Chess	(1 1/2)	0
Gambeit '82	(2)	1	Conchess	(2 1/2)	0

No one knew it at this stage, but Cyrus II had won its last game, beating President Turbo on adjudication. Reuben had his work cut out in this round, for White Knight and the Mk 5.01 also had to be adjudicated. This last was a very complex position, which either computer could have mishandled with ease. A draw seemed the fairest conclusion.

Round Five saw White Knight and Philidor falter and lose their way, though Mark Bryant with a final score of 3 1/2 was still to finish strongly enough to take the second amateur placing and a cheque for £50, while Philidor, on 4 1/2, would take third place overall in the tournament.

The game against Bogol was a stiff test for David Levy's La Regence in Round Six, and it was not without its commercial appeal as well as its chess interest, for both these sensory-board machines are due to be marketed before the end of this year.

After this loss, Martin Suhl was undecided whether he was pleased or displeased with the performance of his machine. No obvious flaws had been detected and its three wins were very reasonable chess games. In retrospect, the two losses Bogol suffered turned out to be to the machines which came first and second overall, and after picking up another point in the final round, the German team went home smiling.

Philidor had an easy game against Spectrum, but Richard Turner, of Arctic Computing thought that the ZX program had held its own well against computers that were very much more powerful. It was the only cassette tape module program in the competition and this is one area where one can expect a greater number of entries next year. Advance 2.4 by this stage looked unstoppable, and it duly crushed President Turbo with a fine mating attack.

The final round was full of surprises. The Mk 5.01 played a marvellous game against Advance 2.4, won material in the opening and looked set to force mate by move 26. But Advance 2.4 held on and although two rooks down, managed to find a position where it could force perpetual check with its queen — the human equivalent of a "swindle."

On board two meanwhile, the Intelligent Software entries finally came up against each other, and much to everyone's suprise, Philidor, which hadn't done much of note till then, chose that moment to play a complex, crafty game against the fancied La Regence and stopped its stable mate from winning 6 out of 7 games.

So although the final round had started with the faint possibility of a tie for first place between La Regence and Advance 2.4 (if the former won while the latter lost), the gods decided otherwise and gave us a clean, clear winner.

Mike Johnson and Dave Wilson took away just about every prize on offer. They won the trophy for the overall winner of the Third Microcomputer Chess Tournament, the trophy for the best amateur entry and a cheque for £150. La Regence was named as the best commercial entry in the tournament and Mark Bryant, as we said, collected a cheque for £50 for the second highest placed amateur entrant.

Be a VIC expert! Our VIC 20 PROGRAMMERS REFERENCE GUIDE provides you with a complete VIC 20 BASIC vocabulary guide, a section on machine-language programming, another on VIC 20 input/output operations, and hundreds of tips on improving your programming skills! Ask for No. 21948, only $16.95.

Speak Sinclair fluently with practical, usable BASIC programming help from Sams ZX-81 BASIC BOOK, No. 21957, for only $12.95. Continue the conversation, in Sinclair machine code this time, with ZX-81 USER'S HANDBOOK, a useful reference that also teaches you the details of ZX-81 hardware and interfacing, and more. Ask for No. 22012, only $13.95 (tentative).

Learn to use beginning and advanced BASIC on your Commodore 64 computer with Sams COMMODORE 64 USER'S GUIDE. Also shows how to create arcade-type color animation, including music and sound effects! Same book that comes packed with every Commodore 64 computer. Ask for No. 22010, only $12.95.

Once you know a little BASIC, you can use your computer to play checkers, predict human choices, make deductions from stored data, generate poetry, and simulate counseling by a psychiatrist! EXPERIMENTS IN ARTIFICIAL INTELLIGENCE FOR SMALL COMPUTERS shows you how, and helps you translate the programs into the BASIC version you need. Ask for No. 21785, only $6.95.

To order these Sams Books or to get the name of your local Sams retailer, call 800-428-3696 toll-free or 317-298-5566 and refer to our ad #AD222.

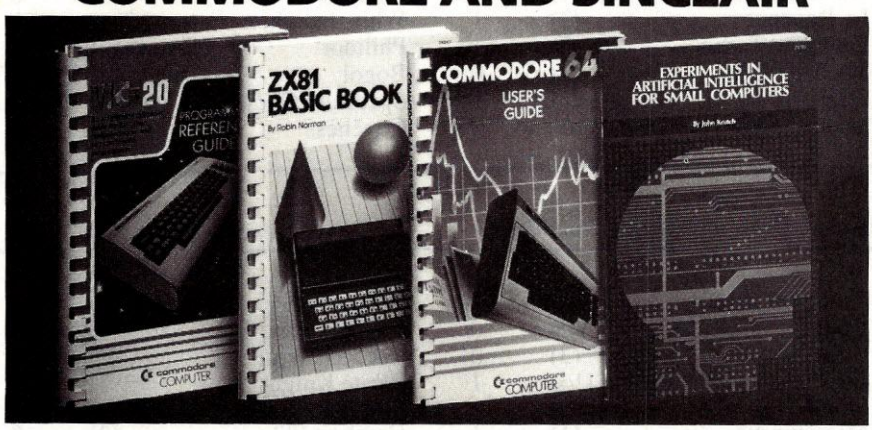
TM

SAMS BOOKS

HOWARD W. SAMS & CO., INC.
4300 West 62nd Street
P.O. Box 7092
Indianapolis, IN 46206

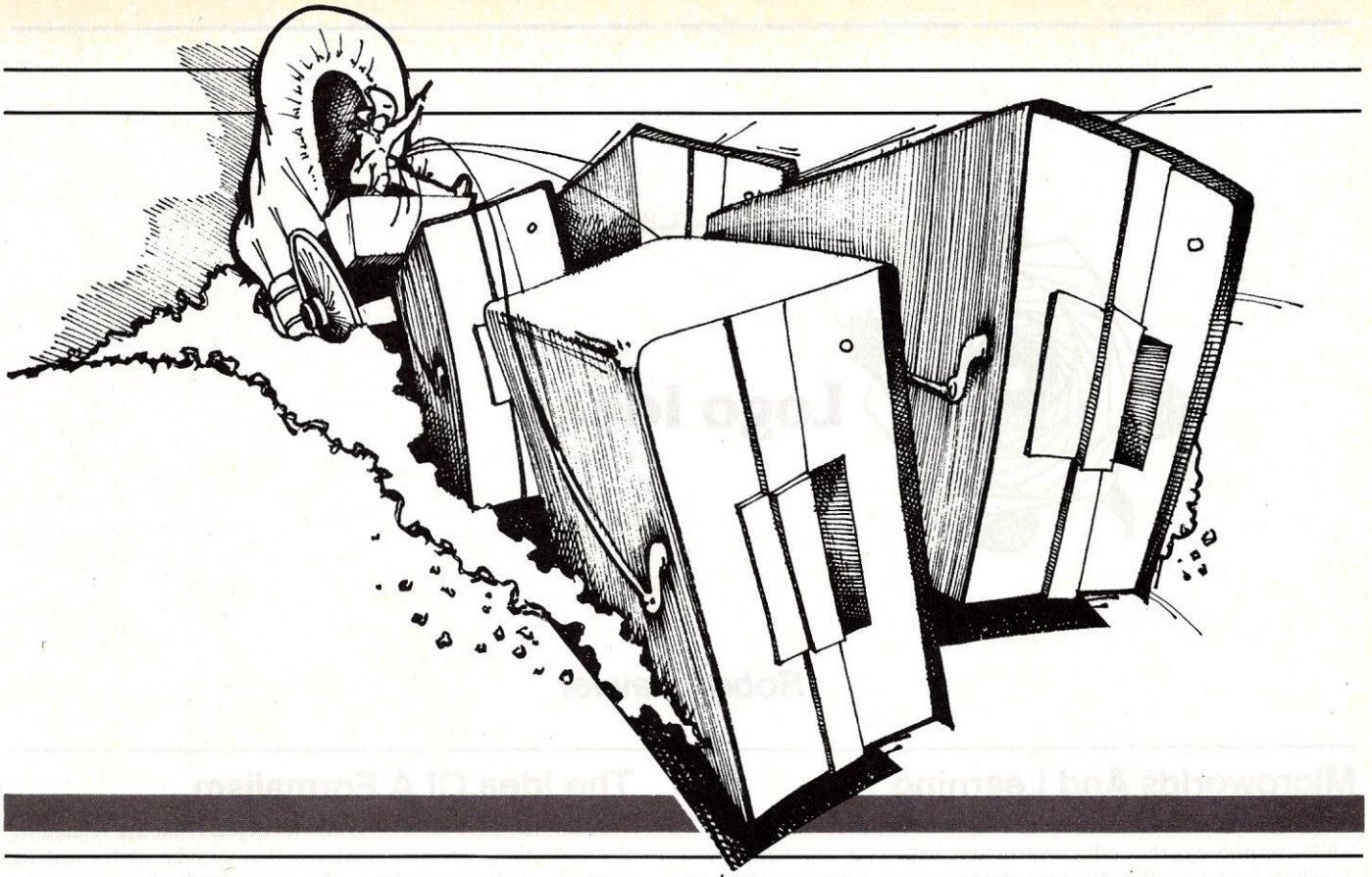
In Canada, contact Lenbrook Industries, Ltd., Scarborough, Ontario.

SAMS BRINGS YOU BASIC ANSWERS FOR COMMODORE AND SINCLAIR



Offer good in USA only and expires 3/31/83. Prices subject to change without notice.

CIRCLE 182 ON READER SERVICE CARD



MACHINE-LANGUAGE DISK I/O & OTHER MYSTERIES, TO HARNESS THE POWER OF DISK DRIVES.

The best and most complete book on TRS-80 Model I and Model III disk I/O available.

"Machine-Language Disk I/O & other mysteries" by Michael Wagner. Volume 5 of the popular ". . . and other mysteries" series published by IJG.

More than 190 pages of information and discoveries on the subject of disk I/O for the beginner and expert alike, using Z-80 Assembly Language to directly control the TRS-80 Model I and Model III disk drives and interrupt systems. With this book anyone can become a disk I/O "expert", and make more efficient use of disk space, or to write his or her own "full blown" disk operating system!

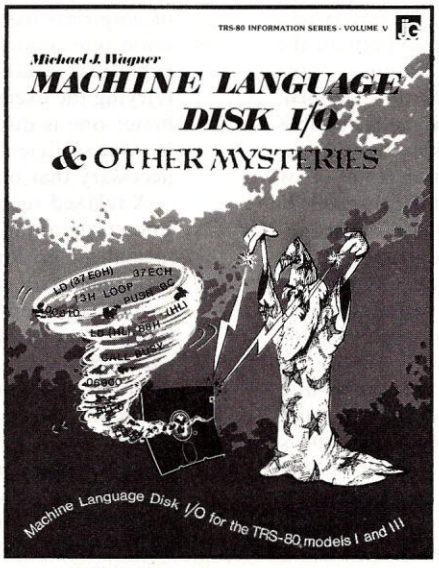
For the beginner and old pro'.

Machine-Language Disk I/O & Other Mysteries is packed with source code and flow chart illustrations for every function and operation described. And the source code for two complete disk I/O driver routines, one for the Model I and one for the Model III, are also included for "instant" access to your floppy drive systems.

Plus, the source code for a small disk operation system (S/OS) is included as a bonus. This S/OS contains all of the routines described in the book and shows how all of the disk I/O and interrupt functions should be incorporated into a working system.

On machine language disk I/O.

Machine-Language Disk I/O & Other Mysteries explains what the floppy drive system is all about, what Tracks and Sector are, the Western Digital Floppy Disk Controller 1771 and 1793 chips, read/write access, reading a selected drives' status, how to test and make sure a disk is in a drive or if a drive is on the system (on-line), the Head Restore command, the Head Step and Seek commands, the "Force-Interrupt of function" command, the Read Address command, the Read Track command, the Write Track (FORMAT) command, the Read Sector command, the Write Sector command, Post Non-Maskable-Interrupt Processing for the model III, and much more.



On TRSDOS file I/O

and most TRSDOS-like operating systems, Machine-Language Disk I/O & Other Mysteries explains; what a disk file really is, what records are and how they're stored on the disk, creating a file, performing Direct Record I/O, performing Single Byte I/O, closing & killing files; error processing and TRSDOS error codes with their meanings, and much more.

Plus many other handy programs, routines, and revelations are included. Such as a TRSDOS error message displayer, a disk formatter program, a program to calculate a password for a given encode, a object file load-format displayer, a file oriented full screen file editor, and a FULL BLOWN smart terminal program.

Machine-Language Disk I/O & Other Mysteries is a must for all programmers at just $29.95. Available at computer stores, selected B. Dalton Booksellers and independent book dealers. If your dealer is out of stock, order direct. Include $4.00 for shipping and handling. Foreign residents add $11.00 plus purchase price, in U.S. funds.

IJG

1953 West
11th Street
Upland, CA
91786 (714)
946-5805

CIRCLE 186 ON READER SERVICE CARD

TM TRS-80 and TRSDOS are registered trade marks of TANDY Corp. © IJG, Inc. 1982

Logo Ideas

Robert Lawler

Microworlds And Learning

The central problem of humane education is how to instruct while respecting the self-constructive character of mind. Teachers face a terrible dilemma in motivating children to do schoolwork that is not intrinsically interesting. Either the child must be induced to undertake the work by promise of some reward or must be compelled to do the work under threat of punishment. In neither case does the child focus his attention on the material to be learned. The work is seen as a bad thing because either it is an obstacle blocking the way to a reward or it is the cause of the threatened punishment.

Psychologists know that much of learning is a gradual process, one of familiarization, of stumbling into puzzlements and resolving them by proposing simple hypotheses in which a new problem is seen as similar to others already understood, and of performing simple experiments to test the latest theory.

Microworlds can be seen as worlds designed for virtual, streamlined experiences, worlds with agents and processes one can get to know and understand. Properly designed microworlds embody a lucid representation of the major entities and relations of some domain of experience — geometry and music are two examples — as understood by experts in the domains. This is where the knowledge of the culture is made available in the very terms in which the microworld is defined.

The child's appropriation of that knowledge is made possible by the microworld not being focussed on problems to be done, but on "neat phenomena" — i.e., the primary manifestation of the power made available by knowledge about the domain. If there are neat phenomena, then the challenge to the knowledgeable expert is to formulate so crisp a presentation of the elements of the domain that even a child can grasp its essence. The value of the computer is in building the simplest model which an expert can imagine as an acceptable entry point to his own richer knowledge.

If there are no neat phenomena that a child can appreciate, there is no function that knowledge of the domain can serve for him. He should not be expected to learn about it until he is personally engaged with other tasks which will make the specific knowledge tolerable as a supporting prerequisite to something desirable to know.

Robert Lawler, Centre Mondial Informatique Et Resources Humaines, Paris, France.

The Idea Of A Formalism

A formalism is a set of symbolic objects that are related by the operations or manipulations that can be performed on them. Everyday arithmetic is an example of a formalism: the numbers are related to one another by addition, subtraction and so forth. We often use formalisms, such as arithmetic, without asking what there is about them that really makes them useful in thinking.

The mathematician-philosopher Whitehead raised this question about the calculus, another formalism, and proposed an answer of the following sort: A formalism is useful because it gives you one less thing to worry about. You learn a set of rules of almost mechanical manipulation, then you can concentrate on how to apply them to a specific situation about which you want to know more. You judge the applicability of a mathematical formalism by whether or not its predictions correspond to what happens in the problem domain.

A programming language such as Logo is also a formalism — but one whose focus is more on its concrete use than on its symbolic prediction. In this sense, the Logo language is a kind of empirical mathematics, one whose value does not depend upon immediately mastering perfectly a set of rules. One can begin with a faulty procedure and perfect it by debugging — retrying the execution until it produces the intended result or a better one is discovered along the way. Eventually, one may become sufficiently expert to compose perfect code, but it is not necessary that one ever do so.

A relaxed requirement for perfection is one major way that Logo programming contrasts with the child's other experienced formalism, arithmetic. This is important because in the world of turtle geometry, the domain of design is so rich that unintended results can often be more attractive than what the programmer first intended. This is a direct contrast with arithmetic — in which errors are of positive value only to psychologists. There is a second sense, however, in which Logo programming requires perfection as much as any other formalism. When one is committed to a specific result, specific operations must be performed in the correct order to achieve that result. Because of the relative richness of the error paths in turtle geometry, Logo may be a more accessible formalism — and a more attractive one — than children commonly met before the advent of computers. □

"The Inflation Fighter is Here"

The "ORANGE+™" $995.00 Suggested List Price

Finally, a dynamic powerful, practical personal computer that is fully Franklin Ace 1000 and Apple® II compatible, yet, lower in price than the competition. Uses existing available software. The "ORANGE+" is the pacesetter of the future, with a **switchable 110-220 volt power supply, upper and lower case with lower case locking key**, enhanced audio and color functions, 8 slot motherboard, game port, fully socketed I.C. board, a 3 ROM operating system, 48K ram, fully expandible.

The "ORANGE+" will interface with peripherals that will work on both the Franklin ACE 1000 or the Apple® II. Thousands of existing software programs, hardware, games, peripherals and accessories will plug right into the New "ORANGE+" COMPUTER.

Best of all is the Price.

The "ORANGE+" could easily be sold for $1500.00, But no, the inflation fighter retail price is only $995.00, thats right, Only $995.00.

Schools, Groups and Companies can now purchase a quality computer at a down to earth price. At these prices, now everyone can afford a powerful personal computer for work or play, add various peripherals and software to build a powerful computer that can do everything the competition can, but for a lot less money.

Ask your favorite dealer for the "ORANGE+" today, if he doesn't have one in stock tell him to write or call his local distributor now.

The "ORANGE+" is fully Apple II and Franklin ACE 1000 compatible.

The "ORANGE+" is fully warranteed for 90 days, with a 9 month extended warranty available for an additional $99.00.

Watch for future exciting products from the manufacturers of the "ORANGE+" COMPUTERS.

Selected Distributorships Available. Dealer Inquiries Invited.

For further information, contact Collins International Trading Corporation, 16311 Ventura Blvd., Suite 500, Encino, California 91436.

ORANGE+™

213-906-3776

Franklin ACE is a trademark of Franklin Computer Corporation
Apple is a registered trademark of Apple Computer Inc.
Orange+ is a trademark of Collins International Trading Corporation

CIRCLE 134 ON READER SERVICE CARD

Introducing GENIE™

5-10-15-20

Megabyte 5.25" GENIE Winchester Drives

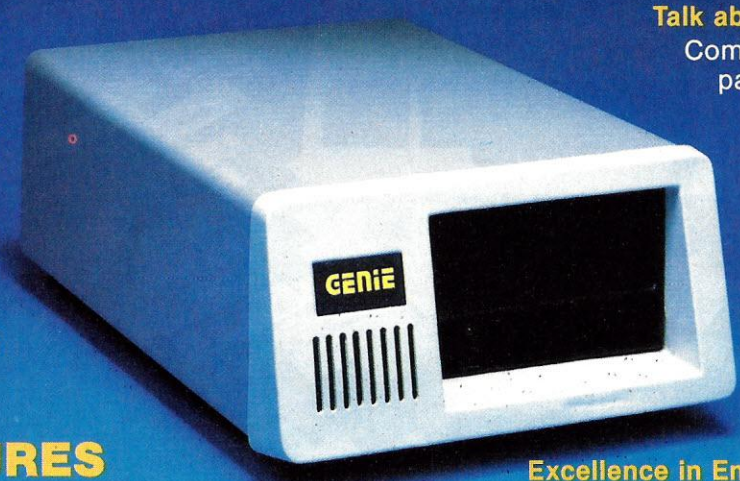
I.B.M. • APPLE II PLUS • RADIO SHACK

5 MEGABYTES
$2295.00

10 MEGABYTES
$2595.00

15 MEGABYTES
$2895.00

20 MEGABYTES
$3195.00



Talk about user friendly . . .

Comprehensive system utilities package.

Allows eight-character names to be assigned to virtual volumes.

User can back-up to either our **5 + 5™** removable Cartridge Drive or to diskettes.

Mix & match different system file types on the same disk.

System status screen messages.

Up to 16 volumes on-line at a time.

FEATURES

- Precision Manganese-zinc heads
- Average access time 77 ms.
- File sizes 5-20 megabytes
- Power-on self test
- Built-in error detection and correction
- System expandable to eight drives
- Comes complete with all necessary software and hardware
- No preventative maintenance required
- Built-in fan
- Operates 110/220 VAC 50-60 Hz
- One year warranty

Excellence in Engineering

Genie Drives were built with the user in mind. A design backed by many years of experience, the Genie Drive is everything a user ever wanted in a hard disk. We offer the **ultimate** in hard disk mass storage systems that money can buy.

IBM	APPLE II PLUS	RADIO SHACK
• *Supports IBM-DOS, CP/M-86, PASCAL*	• *Supports DOS 3.3, CP/M, and PASCAL*	*available soon*
• Ultra High Speed DMA data transfers • Only uses one slot in your IBM-PC • Allows you to run with up to four floppy disk drives	• Boot from Hard Disk • Can assign Hard Disk volume to any slot or drive number in the system	**S-100** *available soon*

*Manufacturer's suggested retail price. Includes all required components.
IBM DOS Personal Computer is a registered trademark of IBM Corporation.
Apple is a registered trademark of Apple Computer, Inc.
Radio Shack is a registered trademark of Tandy Corporation.
CP/M and CP/M-86 are registered trademarks of Digital Research.

Available at your local computer dealer

GENIE COMPUTER CORPORATION

31125 Via Colinas #908 • Westlake Village, CA 91362 • (213) 991-6210

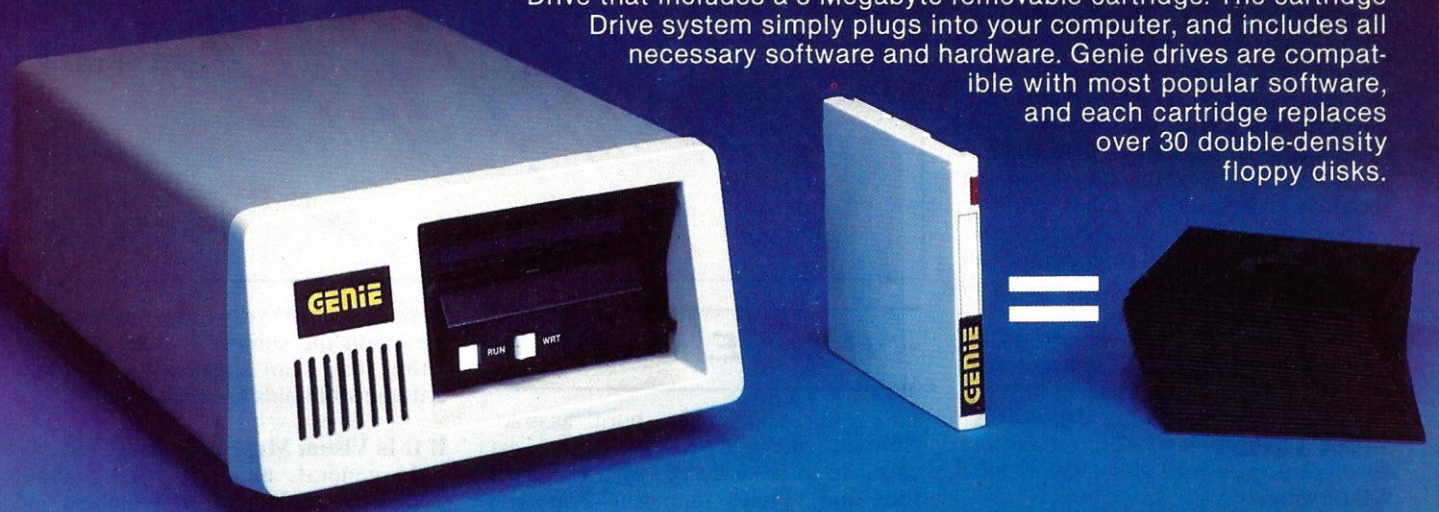
Introducing

GENIE® 5+5™

5.25" Fixed/Removable GENIE Cartridge Drives

I.B.M. • APPLE II • RADIO SHACK

The Genie Cartridge Drive is a revolutionary new 10 Megabyte Hard Disk Drive that includes a 5 Megabyte removable cartridge. The cartridge Drive system simply plugs into your computer, and includes all necessary software and hardware. Genie drives are compatible with most popular software, and each cartridge replaces over 30 double-density floppy disks.



FEATURES

- 10 Megabytes of on-line storage.
- File sizes to 5 Megabytes.
- Power-on self-test.
- Easy back-ups in minutes.
- System expandable to eight drives.
- Built-in error detection and correction.
- No preventative maintenance required.
- Comes complete with all necessary software and hardware.
- MTBF 8000 Hours.
- Built-in fan.
- Operates 110/220 VAC 50-60 Hz.
- One year limited warranty.

Removable Cartridge. Imagine, 5 Megabytes in the palm of your hand. These small cartridges are only .75 inches thick and 5.50 inches square. The disk itself is completely sealed from the outside and all its hazards by a sliding door that opens only once the cartridge is firmly seated inside the drive. Long term availability of this cartridge is assured by its adoption by several well known manufacturers including **Dysan,** the world leader in computer mass storage media.

Only **$3995.00***

Available at your local computer dealer

GENIE®

COMPUTER CORPORATION

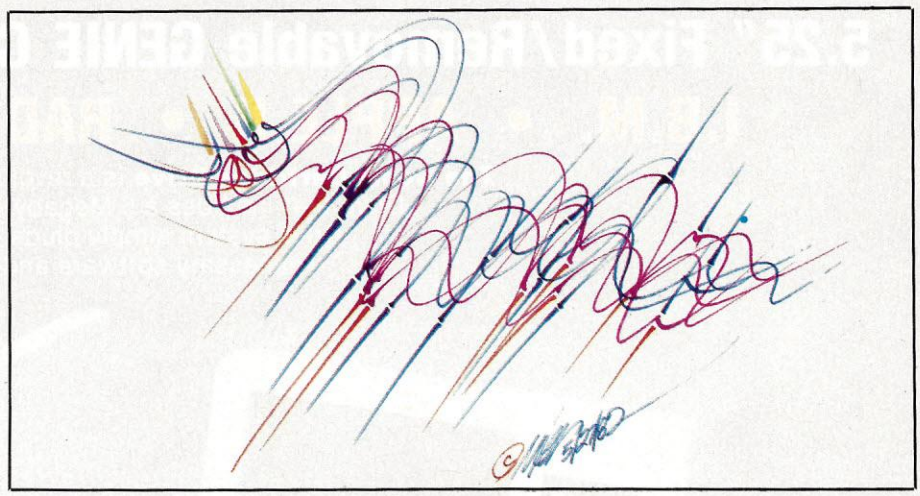
31127 Via Colinas #802
Westlake Village, CA 91362
(213) 991-6210

*Manufacturer's suggested retail price. Includes all required components.
IBM Personal Computer is a registered trademark of IBM Corporation.
Apple is a registered trademark of Apple Computer, Inc.
Radio Shack is a registered trademark of Tandy Corporation.

VISA master charge

CIRCLE 177 ON READER SERVICE CARD

When is Computer Art Art?



Robert E. Mueller

Art is a tricky subject. Everyone recognizes various kinds of objects they call art. Concentrating on the visual arts, what art is to most people usually limits itself to framed pictures hanging on walls. Obviously this may cover a very wide range of pictorial images, from pictures of flowers and landscapes, to abstract images and colorful designs.

The criterion for art most people apply is that a picture must be pleasing to them, and that it must be, at most, complex to the point that it does not quickly vanish in boredom. This means that when a person catches a picture in his eye, it should at least fascinate. But is it art?

Everyone realizes that there is a vast corpus of objects which some people call "art" that differs from what *they* call art. What is the difference — is it just a matter of snobbery? Are the serious art lovers, who embrace a dizzy succession of objects that sometimes seem to verge on the ridiculous, fooling themselves? To put it bluntly: is modern art and the avant-garde you read about skeptically, full of baloney?

To begin with, many art critics feel that there is no longer an authentic avant-garde. Take for example Hilton Kramer, who recently retired as critic for that most prestigious culture-setter, *The New York Times*. Kramer suggested in his swan song that our eager appetite for innovation, our readiness to accept the arcane, the outrageous and the unfamiliar, has killed the very idea of an avant-garde. Regardless how shocking or banal the art form, powerful galleries, museums, and collectors instantly embrace anything that comes along, competing for the honor of discovering something *new* in art. And to make matters worse, government agencies, businesses, and private foundations stand ready to back them with as much money as they need.

Critics and concerned artists have been watching the march of art fashions over the past 50 years with horror. Realism disappeared, expressionism came into being, cubism was born, abstractionism emerged, non-objective art splashed forth, followed by a stream of fads and fancies including Pop Art, minimalism, and field painting, only to return recently to realism.

We must conclude that anything goes in modern art, because the norm seems to be that there is no norm. And if the major critics or aestheticians are confused, what about the rest of us? We must ask ourselves the same question Aristotle, Tolstoy, Kant, Susanne Langer asked: What, after all, is art?

Back in 1976 I wrote a little article published in *Art in America,* and reprinted in *Creative Computing* (May/June 1978), that attempted to apply my years of training as a visual artist to the efforts of computer specialists who dabble in pictorial graphics. I took a look at the images which computer people were creating back then, from the standpoint of an art specialist, and tried to come to some critical conclusions which might help future "computer artists" in their efforts.

Since then I have read many critiques of computer graphics; seen many shows; studied many books on the subject. I have discovered very little to change my views on the subject — which means either that I am stagnant, or that my critique still holds up. (See box.)

If It Is Visual Must It Be Art?

In general, most theorizing about computer graphics as art is upbeat and reassuring. Seldom is a question ever raised about the validity of computer art as art. The assumption is that since it is visual, it must perforce be art. This viewpoint is not only naive, it is sloppy thinking.

The word *art* is taken in its first level dictionary definition as a "skill acquired by experience, study or observation." This definition neglects the conscious use of the creative human imagination for the fabrication of valuable, human aesthetic objects, and never thinks of art as being something with a long history and tradition.

Those with some knowledge of art history frequently put on blinders, rationalizing that their attitude will permit a fresh start in a confused, stagnant field — which admittedly it is. But there is no use reinventing the wheel.

I wish to suggest that traditional art training has something to teach us as computer artists. My reasons are probably selfish: I am a visual artist with a vested interest in many tired old media. I

Robert E. Mueller, 29 Homestead Lane, Roosevelt, NJ 08555.

PERIPHERAL VISION

Floppy Disk Services, Inc. is a contracted SIEMENS drive dealer. Do not let the prices fool you, we buy in very large quantities to get the best price and pass that savings on to you! All systems are of the highest grade components and our cabinets are custom designed with you in mind! If not 100% satisfied, call us and we will promptly refund your money. †

We carry Add-on drives for IBM, Radio Shack, Heath, Apple and most other microcomputers.

Apple II Add on drives	$329.00
Apple 8 inch controller	365.00
Apple 80 track dual system	1395.00
Apple dual 8 inch system w/ controller	1250.00
FDD-100-5b 'flippy' exact HEATH add on	235.00
FDD-200-5 double sided 40 track drive	250.00
FDD-111-5 5ms step IBM or MOD 3 Add on	245.00
FDD-221-5 5ms step 80 track DD/DS	350.00
TEC SFD-51B 5ms 5¼ 48TPI	215.00
FDD-100-8d 8 inch single side DD drive	340.00
FDD-200-8p Double sided 8 inch drive	445.00
Custom 8 inch and 5¼ inch enclosures	Call

System packages available for all drives ...

Dual 8 inch system with EVERYTHING	935.00*
Dual double sided 8 inch system	1125.00*
Single 5¼ Heath or MOD I Add on w/ case	285.00*
Dual 5¼ Heath or MOD I	585.00*
10mb Hard Disk for any computer	2700.00*
CDR controller, allows any combo 8 and 5¼ inch drives to be added to your H88 or H89	Call

* 8 inch systems require minor assembly. Add $100.00 A&T. All 5¼ inch systems come assembled and tested.

† Equipment must be in same condition as you received it.

WE HAVE ZENITH Z-100 SYSTEMS IN STOCK.

Have a disk drive in need of repair? We have expert techs ready to optimize your drives! Call us for info.

AT FLOPPY Disk Services, we not only sell drives, we also sell custom enclosures. Our cabinets are designed by our experts to be functional and attractive. And our quantity pricing is so attractive, we invite dealers and large group purchasers to call.

CALL TODAY • 609-799-4440

IF you don't see what you want, give us a call between 9 am & 5 pm (ET). Chances are we'll have what you need for your system at your price. Due to production deadlines for advertising, prices in this ad are 2 months old, so we encourage you to call us for current prices and new product information.

PAYMENT POLICY – We accept Mastercard, VISA, personal checks & MO. We reserve the right to wait 10 working days for personal checks to clear your bank before we ship. All shipping standard UPS rates plus shipping & handling. NJ residents must add 5% sales tax.

FLOPPY DISK SERVICES INC.

741 ALEXANDER ROAD
PRINCETON, NJ 08540

PRICES & SPECIFICATIONS SUBJECT TO CHANGE

MOD I-II-III, CP/M are trademarks of Tandy and Digital Research respectively.

FD2-1

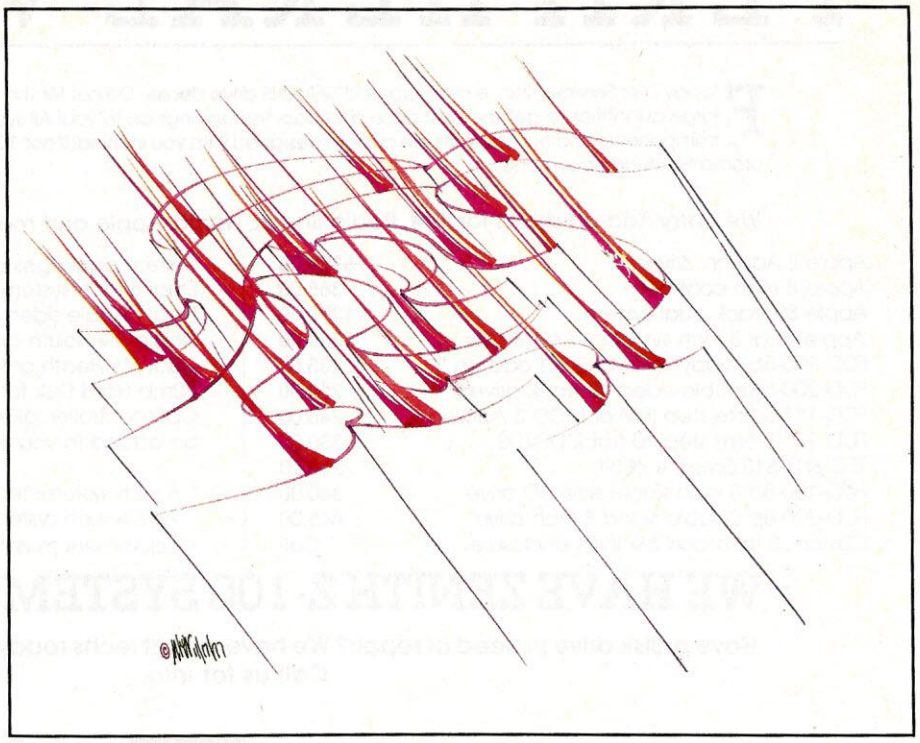
CIRCLE 174 ON READER SERVICE CARD

paint in oils (abstract and expressionistic), do traditional woodcuts and drawings, and sculpt occasionally in wood and clay. But I have also theorized about electric media for many years. See my article entitled "Electric Media," in an early issue of *Creative Computing*, and my book *The Science of Art: The Cybernetics of Creative Communication*, (Day, NYC, 1967).

I have been trying to apply my M.I.T. science background, and N.Y.U. aesthetics/philosophy training to the problem. My conclusions have been hopeful, but the practice I observe is discouraging: Where is there an art using the computer and video media that even vaguely transcends its inherent mathematico-lissajou-feedback design qualities? Or where is one that *uses* it, and succeeds in fascinating me?

Perhaps I am too enmeshed in the old media. But there are, after all, art schools. People spend many years studying art, learning about art, trying to discover the techniques of picture making. The chances are that these people are not all kidding themselves. Out of the many academies of art must have come some expertise in the creation of visual images.

It may be true that this expertise is supplanted from time to time when another aesthetic comes along. This is what makes art evolve like an organic thing. But by and large, certain "rules" have emerged that seem to apply consistently to (most) art forms. I hedge because there are no absolutes in art (no more than in science, although admittedly less definitely so) — which is why people seem to be justified in saying that anything goes in art. The feeling is that art judgment reduces to what you like and don't like. But this is far from the truth.



Fascinating The Critics

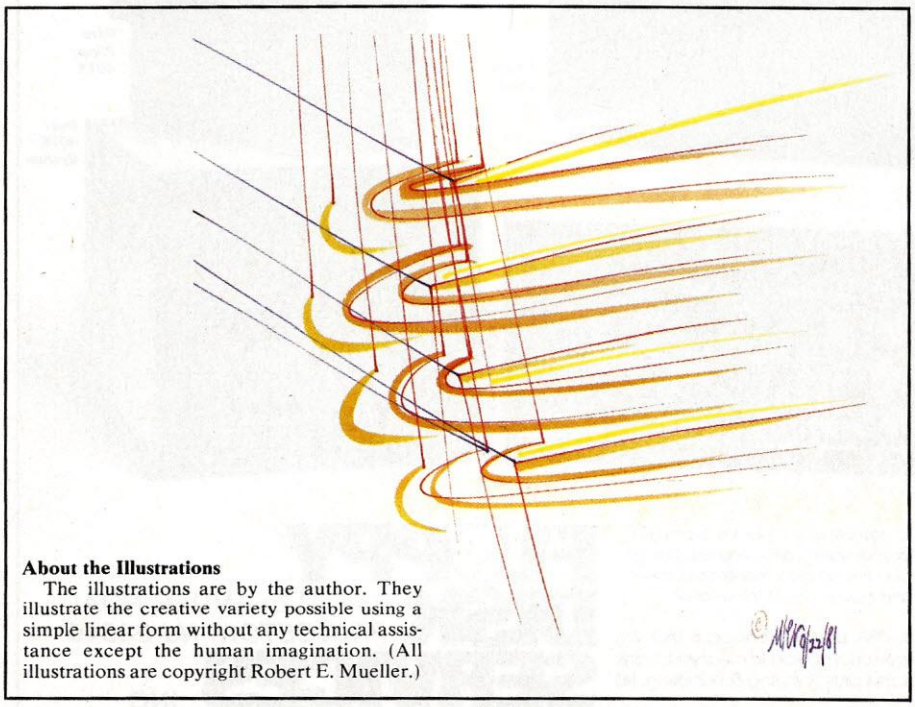
I do not believe that this non-criterion for creating interesting visual images takes you very far in the direction of originality. Let us then agree, at least partially, that we would like our computer art to be original to the extent that it would fascinate a critic like Hilton Kramer. Assume, that is, that we must make images at least as good as — as interesting as — the best in art which currently abounds in the non-computer world. How do we accomplish this? My answer is that we must apply the same criteria to computer products practicing artists use in their craft, regardless the medium.

We must be, first and foremost, critical. We must not accept something which the eye in its naivete thinks is fun, exciting, bizarre, beautiful. The eye, we all know, can be fooled very easily — witness optical illusions. Is this art?

Also the *mind* can be fooled easily — particularly when it comes to what is called "beautiful" in this world. People, especially children and young people, lovely women, and sometimes men, are beautiful; sunsets are beautiful; flowers, nature, landscapes, seascapes and clouds are beautiful. Are images of them all automatically artistic?

We suffer from what the philosopher William Barret calls "the illusion of technique." It is easy to get carried away with technique because it can be so much fun, and so automatic. Especially if you have a powerful technical device like a computer or a holographic camera or a dye-laser to play with. These machines in and of themselves, entirely automatically, have an autonomous quality which, when made visually, causes great wonder.

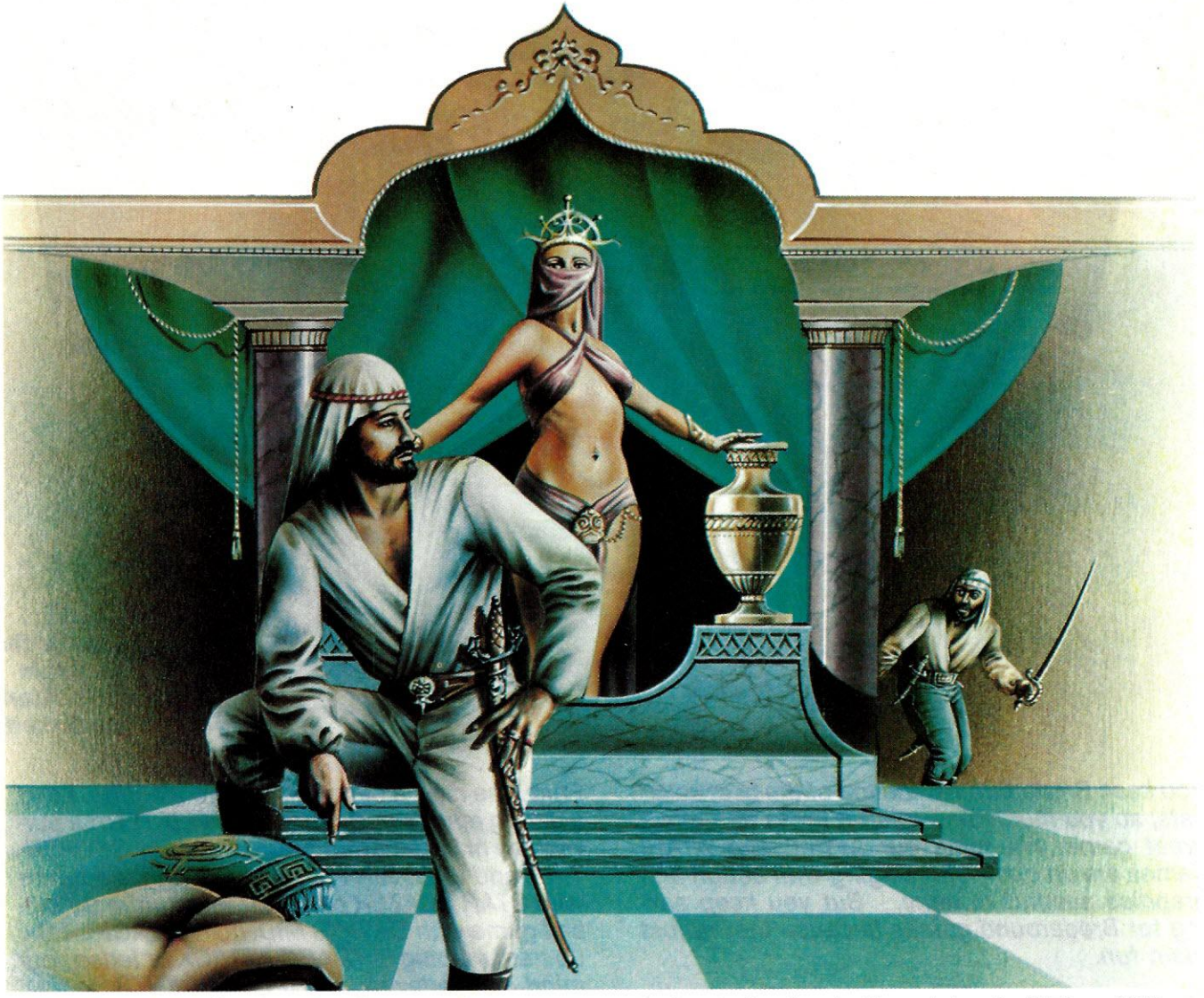
We must therefore be highly critical of what we call art when it comes out of a computer, particularly if we advertise it as "fine art." Otherwise the cultured world with knowledge of art will think, and rightly so, that we are kidding ourselves.



About the Illustrations

The illustrations are by the author. They illustrate the creative variety possible using a simple linear form without any technical assistance except the human imagination. (All illustrations are copyright Robert E. Mueller.)

ali baba
and the forty thieves



A fantasy role-playing adventure for one or more players

By Stuart Smith

ALI BABA AND THE FORTY THIEVES is written in high resolution color graphics and includes music and sound effects. Adventures can be saved to disk and resumed at a later time.

Available for Apple II and Apple II Plus 48K or Atari 800 32K.

On diskette only — $32.95

QS QUALITY SOFTWARE

6660 Reseda Blvd., Suite 105, Reseda, CA 91335 (213) 344-6599

CIRCLE 241 ON READER SERVICE CARD

We could tell you we make We don't have to.

All for the Apple and Atari on diskette.

You keep Brøderbund at the top of the best seller lists, so you must know what it takes to make a great game. We think our APPLE and ATARI games are uniquely challenging with action and graphics second to none. But you keep asking for Brøderbund games because they're just plain fun.

Enjoy the magic of our growing collection. Lead a daring rescue mission in CHOPLIFTER. Or survive the maze and monsters in slithery SERPENTINE and LABYRINTH. Blast through the future with STAR BLAZER or conquer the ultimate pinball game with DAVID'S MIDNIGHT MAGIC. Take up train robbing in TRACK ATTACK or tense your mind and reflexes in DUELING DIGITS.

Brøderbund

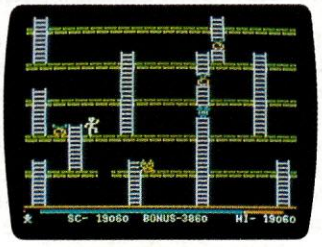
Brøderbund products are available at your retailer or by writing to:
Brøderbund Software, Inc., 1938 Fourth Street, San Rafael, CA 94901 • Tel: (415) 456-6424

Apple II is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari, Inc.

the finest computer games. You keep telling us.

SEAFOX
Sub against the convoy
Apple & Atari disk

DEADLY SECRETS
Hi-res adventure
Apple disk



APPLE PANIC
The arcade classic
Apple disk, Atari cassette & disk

STELLAR SHUTTLE
Monsters and meteors
Atari cassette & disk

THE ARCADE MACHINE

PUT US OUT OF BUSINESS! THE ARCADE MACHINE lets you design and produce your own computer games, without any programming knowledge! Send us your best game and enter the BRØDERBUND ARCADE MACHINE CONTEST. We'll be giving away thousands of dollars worth of hardware and software in prizes. If you have a creative touch and an artistic eye, you too can be an arcade designer. Write to Brøderbund for contest details or visit your participating retail store! (Available on Apple disk.)

Software

All Brøderbund games are fully guaranteed. If they ever fail to boot, return the original disk to Brøderbund for a free replacement. If you have physically damaged the disk please include five dollars for replacement.

CIRCLE 122 ON READER SERVICE CARD

I am sorry to say that a program like *Nova* showing computer specialists turning out what they think is serious art, can appear ridiculous to a practicing artist — at least it did to me. The same applies to much computer music — it makes good background music for movies like *Star Wars,* with added visuals made up of the video feedback or lissajou variations, but that's about as far as it goes for the trained artistic observer. You tend to forget it easily, and have absolutely no desire to hear it again.

Constructive Criticism

Don't get me wrong. I think that the computer and all other electronic transducers are important for art. In fact, it is *because* I think that serious, fine art and music can be created using computer techniques, that I am so critical. It is a shame that so many productions fall so short of the media they try to imitate or transcend.

My optimism about the future of computerizing art is the reason for this article. I hope to snag a mind here and there, and convince them to read Rudolph Arnheim *(Art and Visual Perception),* Ernst Gombrich *(Art and Illusion or The Sense of Order),* R. G. Collingwood *(Principles of Art),* or Susanne Langer *(Feeling and Form).*

There is much more to art than the fun of putting together images and being amazed at the serendipitous results displayed on a color monitor.

Art is more than twists and turns of simple, kaleidoscopic digitized harmonies. Restrict yourself to the technique and you restrict your potential. We are more than our techniques; the ghosts in the machines are what count — all the more so when we try to computerize them.

It is extremely easy for almost anyone to make computers do fun visual things. I have said elsewhere that the computer is like a kaleidoscope. Add color to the equation and you can really go bananas with eye-appealing dazzlings. If you apply some of the more powerful graphic abilities of large computers, you can do some far-out visual things. The recent Walt Disney movie *Tron* proved that computer graphics — especially unleashed in time — can be a successful visual accompaniment to a dramatic plot. To stand alone like music without an opera, however, is another matter.

Many groups are working to create wonderful tools and fabulous techniques for making images. Scientists at the New York Institute of Technology, for exam-

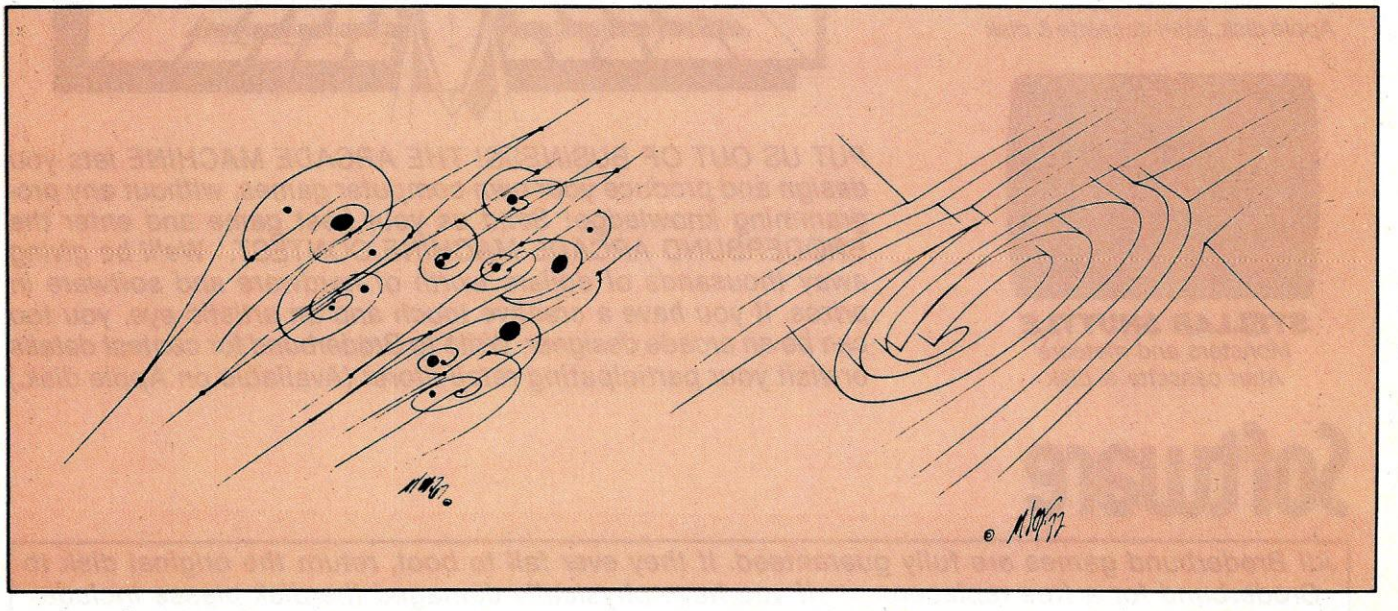
Idols Of Computer Art

In 1622 Francis Bacon wrote his *Novum Organum,* in which he suggested a broad approach to the scientific method that has influenced all scientists since then. Perhaps the most valuable aids he proposed were warnings about the idols or false appearances of the mind.

We know them as Idols of the Tribe, which describes how we are prone to suppose in nature a greater order and regularity than exists there; Idols of the Cave, in which we project errors unique to each of our personalities upon nature; Idols of the Market Place, in which errors arise because of the influence of words; and Idols of the Theater, in which fallacious thinking results from bad methods of philosophical demonstration.

I propose the following Idols in the same spirit as Bacon's, not as impossible ways to make art, but rather as pitfalls that easily fool a person into thinking art has been created.

Idols	Fallacy
Idol Of Nature	Supposing that direct translations of natural forms into recognizable images makes art.
Idol Of The Formula	Taking the inherent orders of mathematical equations and turning them into images.
Idols Of The Kaleidoscope	Being fooled by the artistic look of images made from arbitrarily unleashing the combinatorial graphic powers of computers.
Idols Of The Game	Chasing orders or trapping quotas of chaos to accumulate what seem like artistic images.
Idols Of Disguise	Camouflaging or repackaging images by making transformations in the alembics of design.
Idols Of The Eye	Tricking the eye into thinking that, color illusions or optical novelties are artistics.

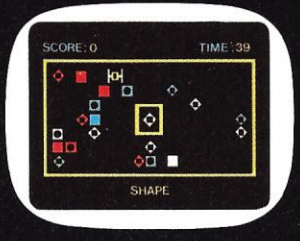


MILLIKEN PUBLISHING COMPANY'S

EduFun!™

Exciting, new educational games for the ATARI*

- **MILLIKEN PUBLISHING** . . . the leading publisher of educational software for schools
- **EDU**cational games . . . designed to help and challenge children at home and school
- **FUN!** . . . for the family and classroom



Put it all together and you've got MILLIKEN'S EDUFUN! programs . . . For your edutainment

CONTACT YOUR COMPUTER DEALER OR

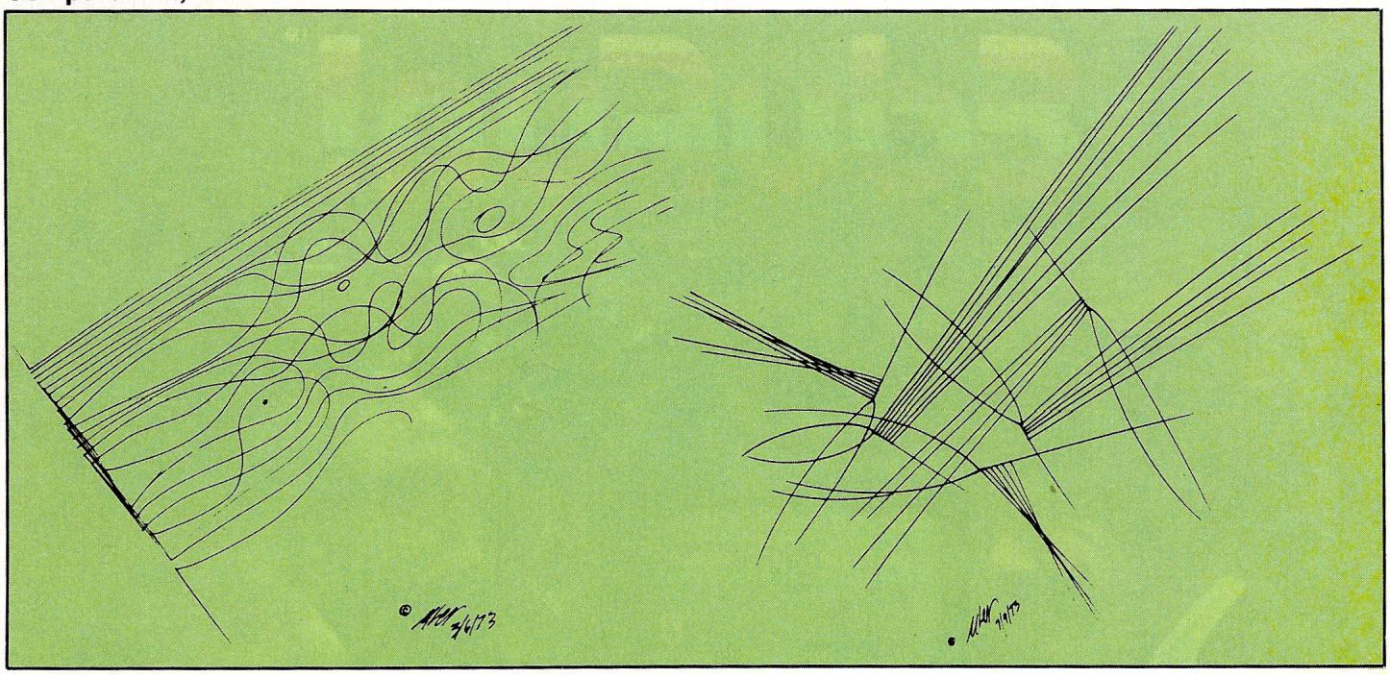
MILLIKEN PUBLISHING COMPANY

EduFun!™ Division

1100 Research Blvd., St. Louis, MO 63132

*Available on the Atari 400 and 800 computers. Available soon on the Apple, TI 99/4, and Commodore VIC 20.

CIRCLE 213 ON READER SERVICE CARD



ple, are at the forefront, taking out many patents on devices for improving our techniques for creating graphics and animation to control the color and contours of characters and scenes unendingly. I have a patent on a video graphic system myself.

The more the merrier — make them available to everyone. Color video pallets are the next thing we are going to see marching into our living rooms or capturing our hand-held calculators and other chip-emblazoned gadgets.

In general all of these devices are quite interesting, at least technically, even to an artist. But will they in themselves enable us to create valid, fine art? Since even the experts seem to be confused about what is or is not art, you might argue that they ought to be included in this most ambiguous category of human production.

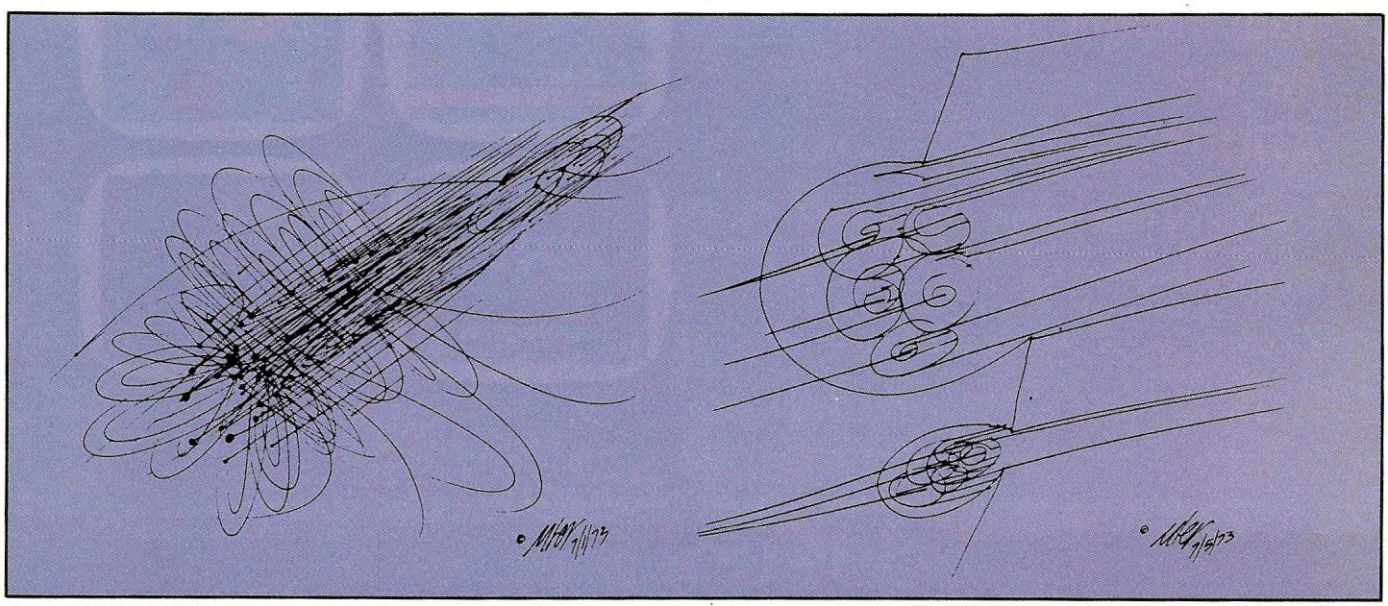
I am not saying that computer graphics, when produced by extremely sophisticated software, is not art. I am saying, however, that most of it appears very boring to an eye trained to recognize interesting visual images.

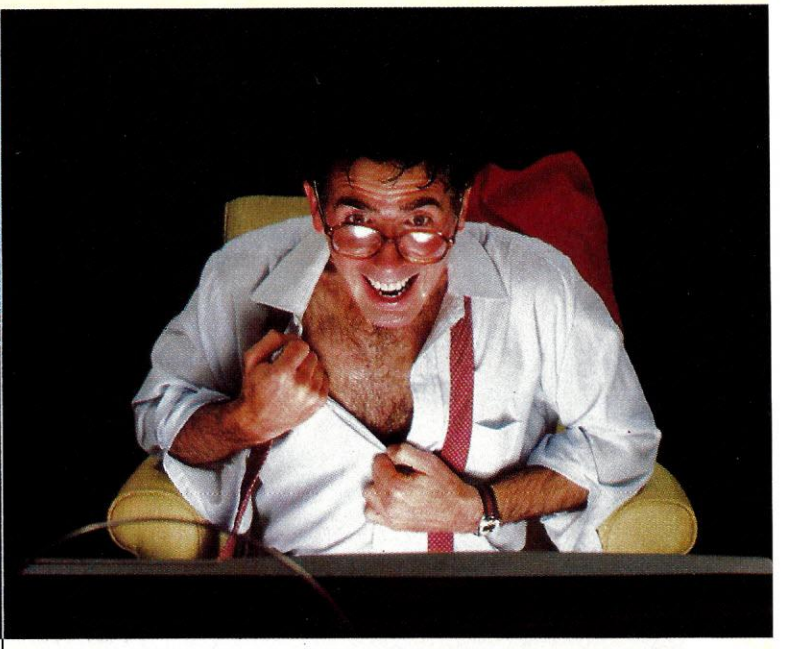
I am further arguing that we should exert caution when calling computer graphics "art." There is a vast world of simple reproduction or pure design which, is not art — although very interesting and original.

Realism is not enough. And design, unlike art, hinges on creating orders within orders; regularities that breed symmetries; proportions that are elegant and derived from magic squares, the perfect mean, and other natural progressions.

I am making a plea for anyone truly interested in turning computer graphics into a more serious art form, to study art history and theory, to go back to the simpler art forms and learn what makes them artistic. Why is a line drawing, made with a pencil, the most elemental of human media, capable of becoming art? This question is not easily answered, but in my opinion it requires considerable study and exposure to great works of art.

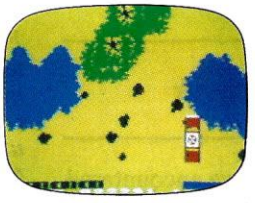
We cannot let ourselves be carried away with dazzling new scientific techniques, believing that they are automatically art just because they overwhelm our untrained artistic eyes. We must look at Leonardo before we can consider ourselves Leonardos. □





WE'VE MADE RECKLESS DRIVING AN INDOOR SPORT.

Grab the wheel in *Hazard Run,* our high-speed cross-country chase . . . and watch the feathers fly! This exciting game features four progressively tougher runs, plus one random run. Smash through the brush, snake around trees and boulders, leap ponds in a single bound, and maneuver on just two wheels. It's all part of the fast moving, fine-scrolling white-knuckle action of *Hazard Run,* 100% assembly language play that flexes your Atari graphics to the max! For more fun than the law should allow, get *Hazard Run* at your local computer store, or write or call today.



Program by Dennis Zander

100% assembly language program for the **ATARI 400/800**
16K Cassette $27.95 24K diskette $31.95

Get it in gear . . . send in this coupon or call toll-free 800-828-6573

ARTWORX Software Co., Inc. 150 North Main St., Fairport, NY 14450 (716) 425-2833

Please send me _____ Hazard Run program(s)

☐ Enclosed is my check for $_____. Bill my ☐ VISA ☐ MasterCard

NUMBER_____ EXP. DATE_____

Signature_____

Name (please Print)_____

Address_____

City_____ State_____ Zip_____

☐ Please send free ARTWORX catalog.

Artworx™
So you can play.

ATARI and APPLE are registered trademarks.

HERE'S WHAT MOTHER NEVER TAUGHT YOU ABOUT VIDEO GAMES.

Settle in for a sizzling evening of *Strip Poker,* our new R-rated program with graphics so realistic that we can't illustrate what you see when you win. *Strip Poker* features Suzi and Melissa, two amply endowed opponents each with their own style of play—one of whom is totally inept. Our sophisticated software stretches the pictorial resolution of your computer to the limit . . . without having to stretch your imagination at all. If you're tired of kids' games and you're ready for the real thing, see your local computer store or write or call for *Strip Poker* today.

Atari version R Rated.

Adult fun for the **ATARI 400/800** and **APPLE II** 40K diskette $34.95

For a good time, send in this coupon or call toll-free 800-828-6573

ARTWORX Software Co., Inc. 150 North Main St., Fairport, NY 14450 (716) 425-2833

Please send me _____ Strip Poker program(s)

☐ Enclosed is my check for $_____. Bill my ☐ VISA ☐ MasterCard

NUMBER_____ EXP. DATE_____

Signature_____

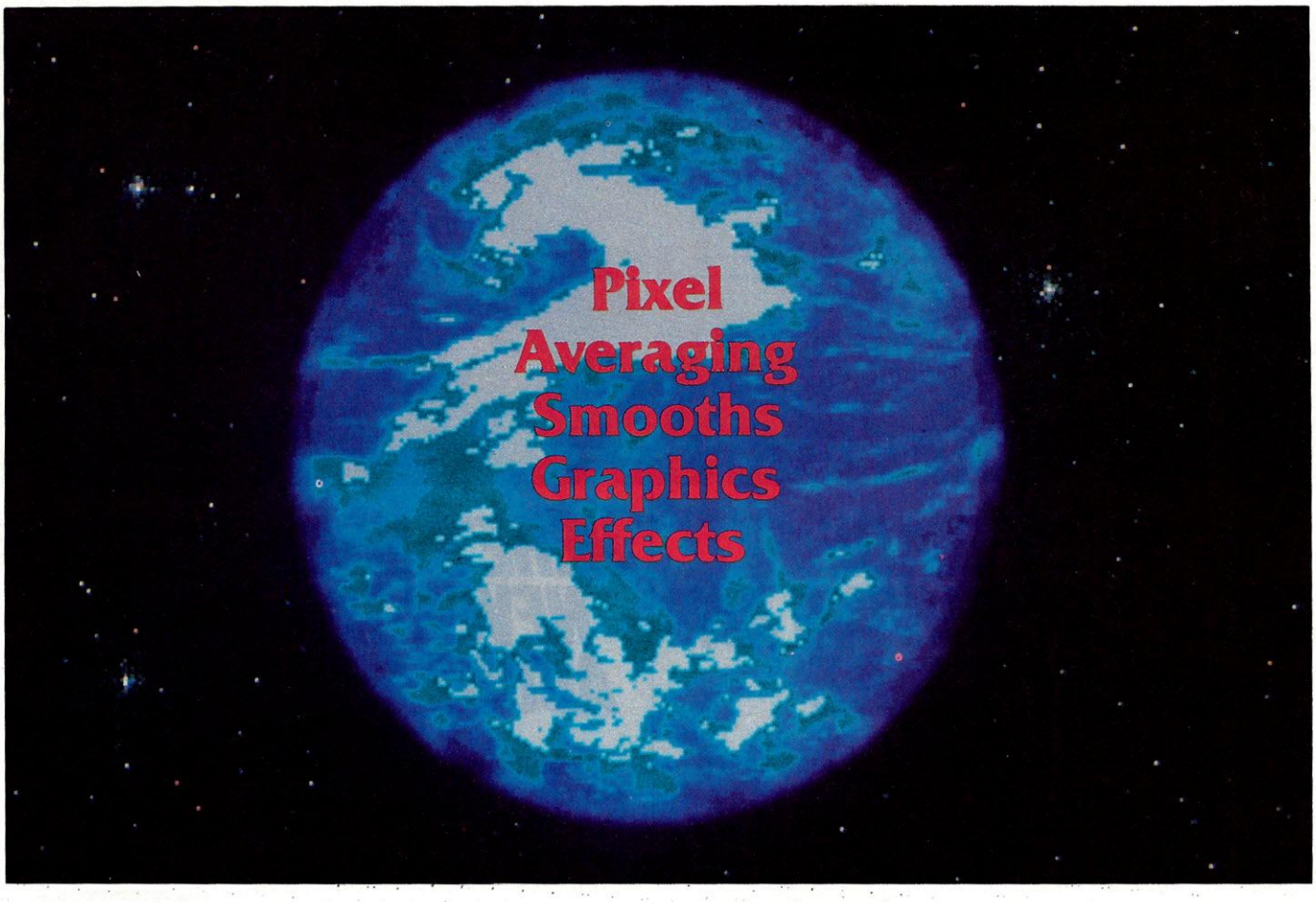
Name (please Print)_____

Address_____

City_____ State_____ Zip_____

☐ Please send free ARTWORX catalog.

Artworx™
So you can play.



Pixel Averaging Smooths Graphics Effects

David Cook

Have you ever looked at NASA's computer enhanced space photographs or any of the computer graphic effects on television and said to yourself, "Someday, I'll own a system with that much resolution"? Have you ever wondered how they achieve such smooth graphic effects?

Chances are, if you already own a computer capable of color or black and white shaded graphics, you can produce smooth graphics and effects without high-resolution and at relatively low cost.

Background

Digital Image Corporation of Grand Rapids, MI was founded in 1981 to create computer graphics and a computer graphics system for advertising, slide shows, TV, and other media presentations. One of our goals has been to design a system which produces very clean, low cost graphics.

Note: All photos were created by David Cook except the two marked with an asterisk (*) which were created by Bill Romanowski.

David Cook, Digital Image Corporation, Grand Rapids, MI 49503.

One of the problems we encountered has been resolution. For example, 35mm slide film has a resolution of about 4000 lines, while few inexpensive computers offer more than 512 lines. A second problem is the fact that 35mm slides are usually projected onto a large screen, increasing the resolution problem.

At Digital Image, we have designed software which produces very clean, full color graphics without matching the 4000 line film resolution requirement. This article attempts to explain just one of the many methods we employ to achieve even graphics.

The ideas presented here should give you a good start. Some of our techniques are not new. However, the ways in which we use some of them are completely new and have provided a great deal of insight into the secrets of computer graphics.

Our computer system includes: a Cromemco Z-2D System Two (Z80 CPU, 64K); Two 5" floppy disks (386K each); Cromemco SDI graphics board; Two 48K image memory planes; a Houston Instruments bitpad; a Via Video digitizer; an Aydin Controls RGB monitor (Mitsubishi in disguise); and a matrix camera (produces 35mm slide from RGB signal from computer).

Resolution in the system is 378 x 241 in lo-res mode (16 colors out of 4096) and 756 x 482 in hi-res mode (two colors out of 4096).

Figure 8. This photo was created by taking various computed images, and manipulating them with Replace, Xor, Or, Subtract, Add and And averaging until they created the earth (notice the thin atmosphere surrounding the earth done with Replace and Add averaging). This became exposure one. The second exposure consisted of the stars which have no averaging. This is a good example of the results obtainable by combining all forms of averaging.

The Basic Algorithm

Though everyone reading this article who currently owns a computer with graphics capabilities will benefit from these techniques, the basic algorithm is geared to computers with a color or

PERSONAL COMPUTERS PERSONAL COMPUTERS PERSONAL COMPUTERS

Altos 5-15D	$2295.00
Amdek Video 300	139.00
Amdek Color I 13″ Monitor	315.00
Atari 800 Computer w/16K	645.00
Atari 810 Disk Drive	439.00
C-Itoh Prowriter 8510AP (parallel)	459.00
Comrex CR-5500 12″ Green Monitor	119.00
Comrex Com-Riter w/Serial Interface	879.00
Daisywriter 2000 Letter-Quality Printer	1049.00
Diablo 630 RO Daisywheel Printer	1999.00
DEC Rainbow 100 Personal Computer	2995.00
Epson HX-20 Portable Personal Computer	659.00
Epson MX-80FT Type III w/Graftrax Plus	499.00
Epson MX-100FT Type III w/Graftrax Plus	699.00
Hayes Smartmodem	225.00
IDS Microprism	599.00
IDS Prism 132 (w/all options & color)	1559.00
Microsoft Premium System for Apple II	579.00
NEC 3510 Letter Quality Printer w/RS232	1529.00
NEC 7710 RO Spinwriter	2195.00
Lear Sigeler ADM3A Dumb Terminal	569.00
NEC PC8023 Dot-Matrix printer	489.00
NEC JB1201M(A) 12″ Green Monitor	169.00
Okidata Microline 82A	419.00
Okidata Microline 83A	695.00
Okidata Microline 84P	979.00
Okidata Microline 84S	1079.00
Rana Elite I Disk w/Controller	465.00
Smith Corona TP-1 Letter Quality printer	639.00
Televideo 950 Terminal	995.00
USI Pi-3 12″ Amber Monitor	175.00
Videx Videoterm	259.00
Xedex Baby Blu CPM Card for IBM	499.00

OMEGA DELIVERS FOR LESS

OKIDATA MICROLINE 82A

or

EPSON MX-80FT

YOUR CHOICE $499.00

SOFTWARE

Omega carries software by the following companies:

• American Business Systems • Ashton Tate • Dakin 5 • Innovative Software • Micropro • Microsoft • Sorcim • Stoneware • Visicorp

MAGNETIC MEDIA

Omega carries diskettes by listed companies:

• Dysan • Maxell • Scotch • Verbatim

ACCESSORIES

Omega carries accessories for the Apple II by the following manufacturers:

• D.C. Hyes • Microsoft • Tymac • M & R Enterprises • Mountain Computer • Kensington Microware • Practical Peripherals • T. G. Products • Videx

CALL TOLL FREE!

800-343-0873

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

We carry the complete line of Atari Hardware, Software & Peripherals.

We will try to match or beat any price with similar purchase conditions.

OMEGA SALES COMPANY

430 PEARL STREET, STOUGHTON, MA 02072

(617) 344-6645 TOLL FREE (800) 343-0873

Figure 1. This photo was made by taking the word CREATIVE COMPUTING, and Replace averaging it to the alternate page. After each average, all colors are converted to 15 (the brightest) and the result is again averaged. This is done in order to make the glow appear larger then the actual wording. After the desired glow size is obtained, the words CREATIVE COMPUTING were copied over the glow and then Xor copied, leaving the inside black. Then the outline of the word was copied into the glow using color 15 which was converted to orange while the glow was shaded between black and red.

Figure 2. This photo was made by taking the word GLOW and Replace averaging it to the alternate page until the desired glow was obtained; this became the first exposure (in cyan). The second and third exposures were obtained by taking a sphere, inverting it (via Xor) and fuzzing it until the desired glow was obtained. These were then shot in red and green respectively.

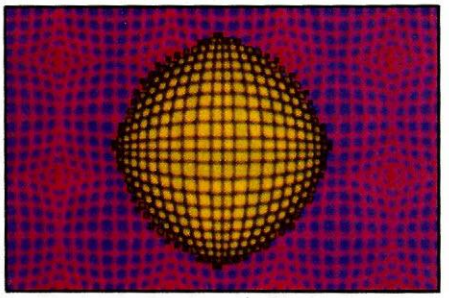


Figure 3. This photo was made by taking a sphere, inverting it, Replace averaging it, and shading it between black and yellow. This became exposure one. The second exposure was created by taking the inside of the sphere and keying it onto the rest of the frame on color zero (background) which has the effect of placing the image behind *the center sphere. This image was then shaded from black to red and then from red to blue and shot. Notice the outside edge of the center sphere is not smooth. This is because the outside edge does not sit next to a complementary color, thus jagged edges show up.*

black-to-white shaded map display, such as Atari, Cromemco, and Cromatics. The basic algorithm, and the one from which all other techniques described in this article are derived is called *pixel averaging.*

In pixel averaging for any given pixel on the screen, an average can be calculated by adding the values of all neighboring pixels and then dividing by the number of neighbors and plotting the result. For example, below we see a pixel (center pixel with a color map value of 2 surrounded by pixels of different map values:

3 4 15
7 2 10 (2 is the center pixel)
1 9 5

In calculating the average of the center pixel:

$$P' = (P1 + P2 + P3 + P4 + P5 + P6 + P7 + P8)/8$$

or

$$P' = (3 + 4 + 15 + 7 + 10 + 1 + 9 + 5)/8$$

or

$$P' = 6 \text{ (drop the fraction)}$$

To apply this algorithm correctly, scan the area containing the image and apply the algorithm to each pixel within that area. The result from each calculation may be immediately plotted back onto the display over the original pixel. However, much cleaner results are obtained if the averaged information is plotted somewhere other than on top of the original image—another image plane, disk, core, or even somewhere else on the same image plane.

If the results are plotted over the original, you will obtain a similar result, with a slowly accumulating degree of error. The error occurs because the pixel you just changed is a neighbor to pixels you are about to change. If you plot the new pixel on top of the old pixel, you will be changing future results for the neighboring pixels. (Later on however, I will explain how plotting the new pixel over the old one can be useful.)

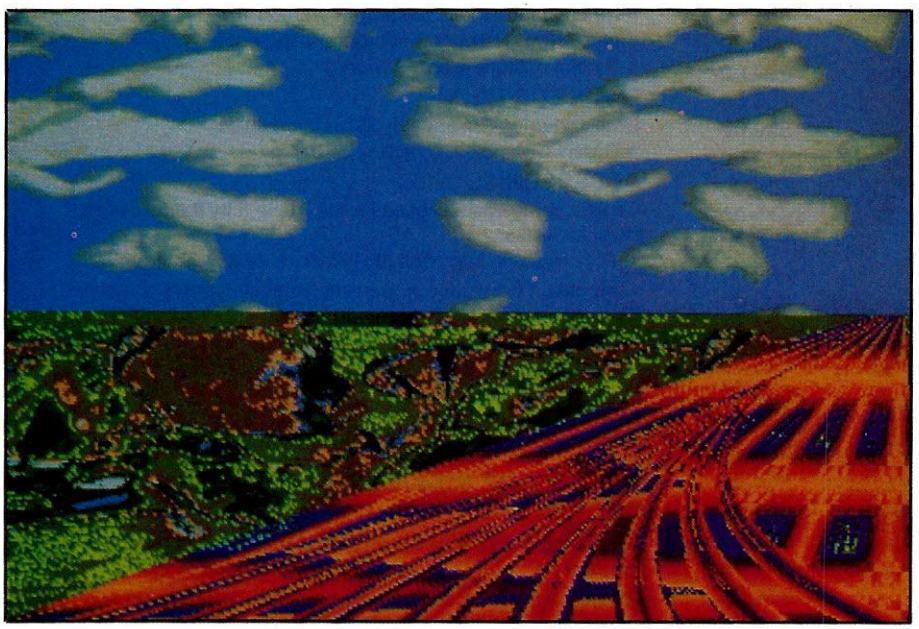


**Figure 5. This photo was created by taking a straight two-dimensional grid, tilting it in the horizontal direction with a skew added (this makes it disappear to a horizon) and then tilting it in the vertical direction (this made the grid curve). The grid was then Replace fuzzed and shot as exposure one, the road. The next exposure was created by digitizing pieces of tissue paper and REPLACE fuzzing them to add softness. These became the clouds. The final exposure was created by taking the same tissue paper used for the clouds and repeatedly Or fuzzing it to create the rock and roadside images.*

BASF QUALIMETRIC™
A TOTALLY NEW DIMENSION OF QUALITY.

From BASF comes a totally new level of excellence in magnetic media – the Qualimetric standard, a standard so advanced that BASF FlexyDisks® are confidently backed by the industry's only lifetime warranty. The Qualimetric standard is maintained without compromise through every step of BASF design, production, inspection, and testing...reflecting an unwavering BASF commitment to media fidelity and durability.

*Our FlexyDisk jacket, for example, incorporates a unique two-piece liner that not only traps damaging debris away from the media surface, but also ensures precise media-to-head alignment. The result – certified 100% error-free performance, backed by BASF's exclusive lifetime warranty.**

For information security, tomorrow and beyond, look for the distinctive BASF package with the Qualimetric seal. Call 800-343-4600 for the name of your nearest supplier.

ENTER TOMORROW ON BASF TODAY

BASF BASF

*Contact BASF for warranty details.

© 1982, BASF Systems Corporation

CIRCLE 312 ON READER SERVICE CARD

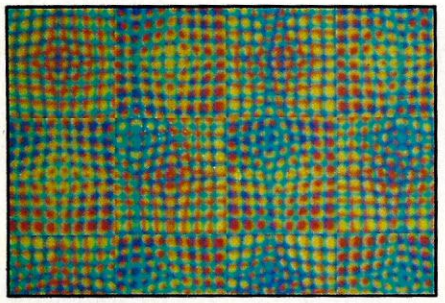


Figure 4. This photo was created by taking three different versions of the background created in Figure 3 and shooting the first shaded between black and red, the second shaded between black and green, and the third shaded between black and blue. This causes much color interference on film which shows up as beautiful hues. All of the exposures were Replace fuzzed to enhance the interference.

Once an image has been averaged, the color map must be adjusted to provide the smoothest display possible. This is probably the most important and difficult (depending on your hardware) step in pixel averaging.

To explain how to arrange the color map, let me describe the way it is done on our system and then offer examples to make it work on other systems.

On the Cromemco, in low resolution mode (378 x 241) up to 16 colors out of a possible 4096 may exist on the screen at the same time. The colors are numbered 0-15, the actual numbers written when a pixel is placed on the screen, and thus the actual numbers being averaged.

Each color number (0-15) on the Cromemco may be assigned a red, green and blue gun value between 0 and 15. This allows any color (0-15) to be any one of the 4096 colors available (16 x 16 x 16). The map must be arranged so that the lower the color number, the darker the color. Therefore, if I want my image to glow a smooth blue, I shade my color map as shown in Table 1.

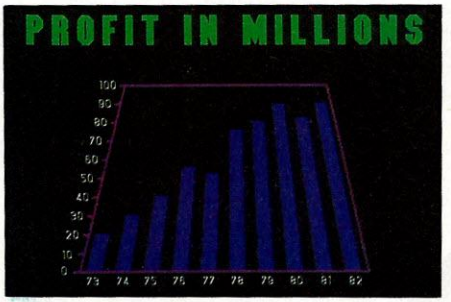
Table 1.

Pixel Value	Red Gun Value	Green Gun Value	Blue Gun Value	
0	0	0	0	—Black
1	0	0	1	—Darkest blue
2	0	0	2	
3	0	0	3	
4	0	0	4	
5	0	0	5	
6	0	0	6	
7	0	0	7	
8	0	0	8	—Medium blue
9	0	0	9	
10	0	0	10	
11	0	0	11	
12	0	0	12	
13	0	0	13	
14	0	0	14	
15	0	0	15	—Full blue

In effect what averaging together with proper color map manipulation does, is take a particular neighborhood and modify the color of the center pixel to make it "more like" its neighbors. If half of the neighbors of a center pixel are zeros (0) and half are fifteens (15), the center pixel will become a seven (7).

As the neighborhood moves through the area containing the image, each of the center pixels becomes more like the neighbors. (Remember, all neighbors get a chance to become center pixels.) This has the effect of fuzzing the image, or making it glow. Therefore, if the map is shaded from dark to light, the image will appear smooth.

This method should work on machines such as the Atari, but users of machines with fixed color maps such as the Apple and TRS-80 will find it more difficult to obtain smooth images. For these machines, assign a lookup table of colors arranged so the darkest color value is first and the brightest color last. When you read a pixel from the screen, average the index to the color in the table, not



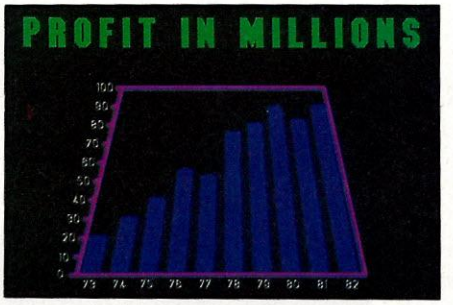


Figure 6. This photo was created by taking a two dimensional bar chart, Replace averaging it to the alternate page and tilting it to a horizon. The second and third exposure are composed of the word copy (the first in green, the second in white) and are done in high resolution (756 x 482 x 1 color). Figure 7 is Figure 6 without any *averaging to show how averaging smoothed out the jaggies.*

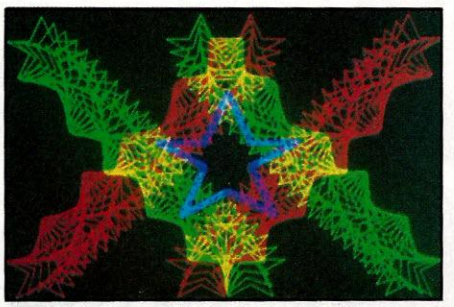


Figure 10. This photo is an example of our Odd language in action. The first two exposures were the red and green rotating and flipping stars. The last exposure was the center blue star which was Replace averaged.

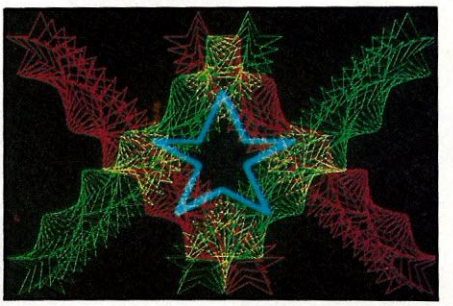


Figure 11. This photo is identical to Figure 10 except that all *components were Replace averaged.*

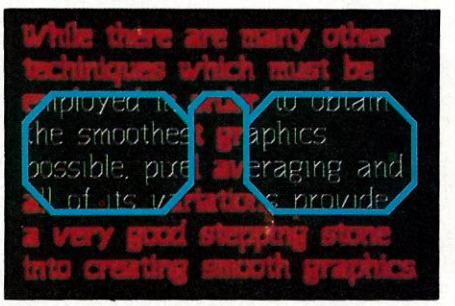
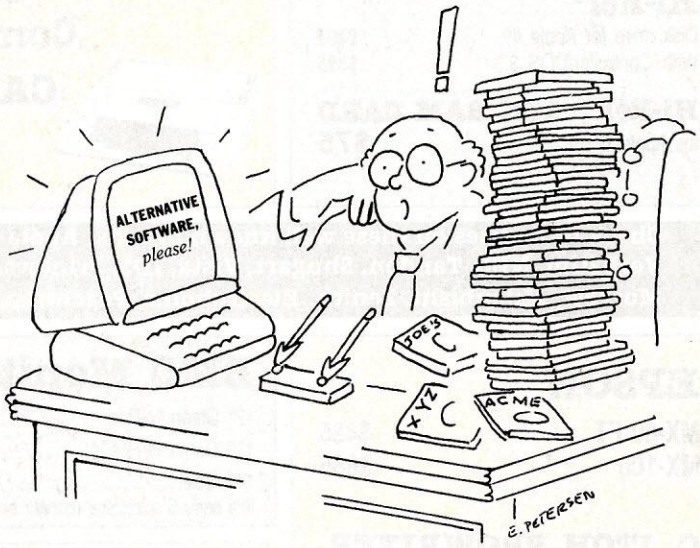


Figure 9. This is a fun photo, and a good commercial effect. (Note that the text is from the article.) The photo was created by taking the text and Replace fuzzing only words existing outside of the glasses. This became exposure one in low resolution, shaded between black and red. The second exposure was the text existing inside the glasses which was shot white in high resolution. The third exposure was the glasses which were shot cyan in high resolution.

If Your Apple™ Could Choose Your Payroll Software...

It would choose MICROPAYROLL™ from ALTERNATIVE SOFTWARE, INC.



Even the Apple, the largest selling personal computer in the world, is only as intelligent as its software. And APPLE ORCHARD, the magazine for Apple users, rates **Alternative Software's MICROPAYROLL #1** for tackling the time-consuming complexities of payroll.

So if you have 2 to 145 employees, an Apple II Plus or Apple III, Alternative Software has the best available payroll program. Here's Why:

1. MICROPAYROLL has been USER-TESTED for over three years.
2. The inexperienced payroll clerk will find the instruction manual exceptionally easy to understand; actual examples of problems and their solutions are included.
3. MICROPAYROLL can pay each employee in one or more modes: Fixed-Salary, Commission, Piecework, Hourly, Multiple Overtime Rates, or any combination thereof.
4. Your payroll clerk can update the tax tables himself. Costly factory updates are not required. Handles up to three states simultaneously.
5. Can adapt to nearly any printer.
6. All necessary payroll data is produced and printed: Paychecks, Quarterly Reports, Year-To-Date, W-2 Master Listings, W-2 Slips, Master Payroll List, Seniority List, Time Card Data Entry.
7. Password and Management protection.
8. The Alternative Software MICROPAYROLL is backed by a network of local dealers who can provide technical support and who have direct access to the manufacturer.
9. **Special Introductory Offer from RF Distributors: $299.00** ($50.00 off the $349.00 retail price). Buying an Apple plus Alternative Software's MICROPAYROLL is less expensive than one year's payroll service!

The key to the performance of your computer is the quality of the software that runs it.

For more information on Alternative Software's MICROPAYROLL, please call Jack Loughridge at (609) 424-6055. Or, clip the coupon below.

ALTERNATIVE SOFTWARE, INC.

THE INTELLIGENT ALTERNATIVE

For more information on RF Distributors special offer, mail this coupon to RF Distributors, Dept. A-11, 314 Society Hill Blvd., Cherry Hill, NJ 08003.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

BUSINESS PHONE ( ) _____

APPLE is a trademark of Apple Computer, Inc.
MICROPAYROLL is a trademark of Alternative Software, Inc.

CIRCLE 106 ON READER SERVICE CARD

SAVE!

- Discount Prices
- Nationally Advertised Brands
- Value-Added Testing*

Hi-Rel®
Disk drive for Apple II® $295
With Controller/DOS 3.3 $395

Hi-Rel® 16K RAM CARD
for Apple II® $75

48K Computer CALL $$

AST RAM Combo / Clock for IBM
- 64K Parity RAM, expandable to 256K
- Serial Port
- Parrallel port
- Clock with battery on-board $375

Additional sets of 64K RAM.....$65

Check our prices on these well known brands: Apple Amdek, Televideo, Novation, Videx, Dysan, Verbatim, NEC, Tandon, Shugart, Vista, IDS, Printers, Sanyo, Compu Pro, Hayes, Siemens, ADDS, Morrow, Mitsubishi, Zenith, Electrohome, Peachtree, Xedex, Corvus, QT, Orange Micro.

EPSON
MX-80 FT $485
MX-100 $665

C. ITOH PROWRITER
120 cps matrix, 80 columns.....$485
120 cps matrix, 136 columns.....$665

OKIDATA
U82A.....$435
U83A.....$665
U84.....$995

Comrex Daisywheel....$815
F-10 Starwriter.....1345

Disk Drives, Cabinets, & S-100 Hardware. We carry a complete selection.

BMC Monitors
12" Green Lo-Res.....$85
12" Green Hi-Res.....149
14" Color.....$275
We carry 5 additional monitor boards.

HAYES
Smartmodem.....$215
Smartmodem 1200.....$575
We carry 4 additional modem brands.

DYSAN
Box of 10, 5¼".....$37.50
Full line at similar discounts.

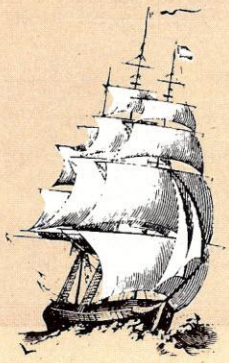
dBASE II $469
Other quality software at similar discounts.

Hi-Rel® Hard Disk For Apple II® , 10 MByte, CP/M® Compatible $2100
We carry 3 brands of hard disks for Apple, IBM, S-100, and NEC.

COMPU PRO Full line 15% Discount
Other S-100 lines at similar discounts.

Ribbon Cartridges for EPSON
MX-80/Black.....$25/3 pcs.
MX-100/Black.....$39/3 pcs.

***Value-Added Testing**
For $20 per item, we will open, test, and re-pack each item prior to shipping. This is a general functionality inspection, and does not alter the manufacturer's warranty.
Take the worry out of buying mail order!



IRONSIDES
COMPUTER CORP.
(213) 344-3563 (800) 528-9537
18546 Sherman Way, Suite #110, Reseda, CA 91335

Verify prices by phone. Shipping is extra except within the Continental U.S. on prepaid orders. California orders, add 6½% sales tax.

CIRCLE 229 ON READER SERVICE CARD

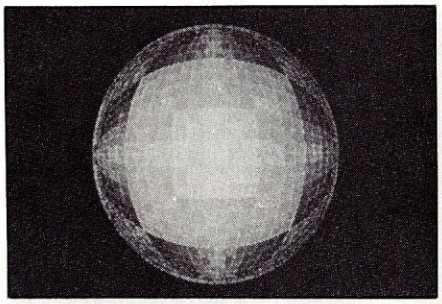


Figure 12. This photo was created by taking a high-resolution sphere (the same one used to make the Earth slide) and manipulating it using Subtract, Replace, Or and And averaging until a somewhat smooth image resulted. Replace averaging is responsible for the three-dimensional look.

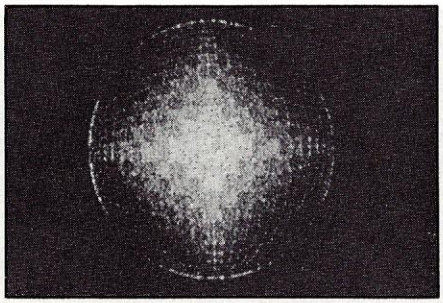


Figure 13. This photo is similar to Figure 12 in that the basic image was created in much the same way. However, the shading and three-dimensional look were added by many repeated Replace averages.

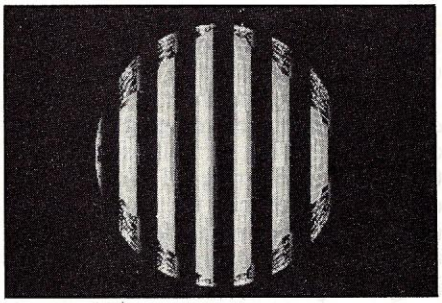


Figure 14. This photo is similar to Figures 12 and 13 in that the basic image was created from a high-resolution sphere. After the initial shape was created, it was And Copied onto bars which had been Or averaged to produce the effect of light shining from an angle. The bars were then And Copied onto another image which placed the dark and light shapes onto the bars. The result was then Replace Copy Averaged onto Replace averaged bars to give the edges a very smooth and three-dimensional look.

the actual color value. When writing the new pixel out, write the color *at the index* in the array corresponding to the result from the calculation. This method will pseudo-shade on fixed map machines. To understand this method better, try the following example:

Let us imagine that your computer only has the following eight colors:

0 = Black
1 = White
2 = Light blue
3 = Red
4 = Dark blue
5 = Yellow
6 = Dark green
7 = Dark purple

You would create an array, arranging the colors from darkest to lightest (you may have to experiment to see what order works best as follows:

(1) = 0 (Black)
(2) = 7 (Dark purple)
(3) = 6 (Dark green)
(4) = 4 (Dark blue)
(5) = 3 (Red)
(6) = 5 (Yellow)
(7) = 2 (Light blue)
(8) = 1 (White)

Let us then imagine that in reading a neighborhood, you find the following colors:

0	1	2
0	7	5
6	0	4

Before (or during) averaging, convert the colors using the table. The results will be:

1	8	7
1	2	6
3	1	4

At this point, the lower the number, the darker the color. The higher the number, the brighter the color.

Now average all pixels except the center pixel:

$$(1 + 8 + 7 + 1 + 6 + 3 + 1 + 4)/8$$

The result is 3. Now determine which pixel is to be plotted:

NEW PIXEL = ARRAY (RESULT)
or
NEW PIXEL = ARRAY (3)
or
NEW PIXEL = 6

It is very important to note that when doing pixel averaging, the smoothest results are obtained if the background is black. Bright backgrounds cause jaggies, so keep the background to the darker colors if not completely black.

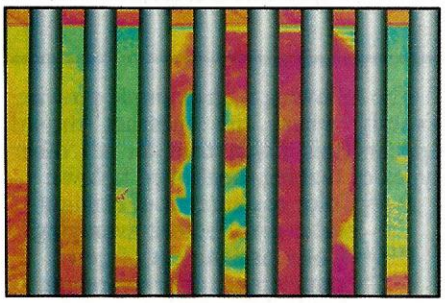
Continued pixel averaging causes the image to glow more and to become less jagged with every pass.

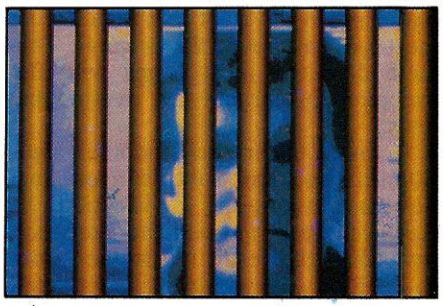
You may be wondering why we don't average the center pixel. The reason for this is that our routines are in assembly language which makes dividing by 8 much faster than dividing by 9. The center pixel does not weight the algorithm too much, but if you do decide to include it, make sure to divide by 9, not 8.

Uses Of Pixel Averaging

I call the type of pixel averaging mentioned above *Replace Averaging* as the result is replaced directly on the screen. Replace averaging is best used for one of the following functions:

Clean noise from a digitized image. Replace averaging reduces (by averaging) all noise inherent in digitizing. Continued averaging will slowly reduce





**Figures 15 and 16. This photo was created in two steps. The first was to take shaded bars and to Or average them to create the effect of light shining from an angle. The second step was to take a picture of the Wag (Douglas Wagley) and Replace average out some of his facial features. Next, various objects in the background (such as a light switch on the wall) were edited out of the image. Finally, the bars were Copied over Doug and then Xored to erase them. The bars were then shot as one exposure and Doug as the second exposure.*

all random grey scale elements, causing the digitized image to appear computed as opposed to digitized.

Clean up jagged lines in computed drawings. Replace averaging only once on a line drawing (or solid shape) has the effect of blurring all borders and edges. This reduces the jagged edges inherent in low resolution drawings. Continued pixel averaging causes the image to glow more and to become less jagged with every pass. You will obtain cleaner graphics if before averaging, every color except background in the image is converted to the lightest color. This places the entire image at the top of the color map with the background at the bottom. Averaging at this point slowly and smoothly pulls the color of the outer edges of the image toward the color of the background.

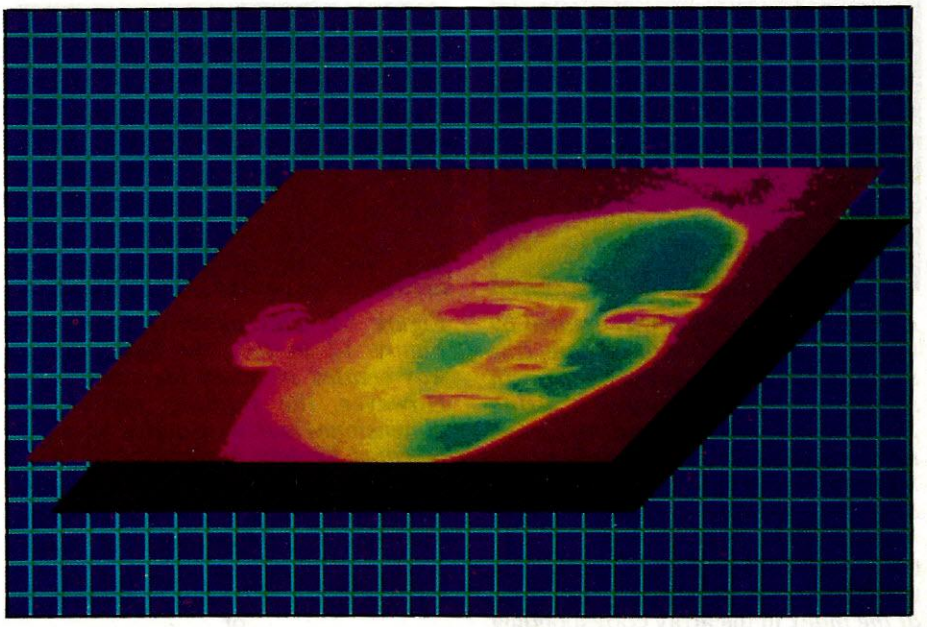


Figure 17. This photo was created by taking in a picture via the video camera and tilting it through software. This was then Copied on top of the grids and then Xored to cut the picture out leaving the shadow. The picture was then moved up and Copied back in. Finally the picture was Replace averaged and randomly colored to provide linked shading.

Variations On A Theme

Once you understand basic Replace averaging, variations are simple to implement. From here on we will deal with very simple variations on Replace averaging which provide many different results. Some of these variations are dependent on the color map being shaded, others are not. Therefore, some of them will be useful to anyone who has a computer with graphics capabilities whether it has color or color maps or not.

Edge Detection

Sometimes it is useful to be able to detect just the edges (boundaries between colors or grey shades) of images. Uses range from art, to being able to detect, identify and track a fast moving missile via computer (and I don't mean video games).

Normally, edge detection is accomplished by taking a copy of the image, shifting the copy one pixel up and one pixel to the right and then xoring the copy back over the original. This method leaves most edges with the exception of corners and overlapping lines.

A much faster and smoother algorithm is one I call Subtract averaging. Subtract averaging is identical to Replace averaging with the exception that when the result is obtained from averaging the neighbors, it is subtracted from the original center pixel before being plotted to another page or area on the screen.

Note that you *must* plot the result somewhere other than on top of the original image or the effect you get will not be edge detection.

If Subtract averaging is handled properly, what you should end up with is an image consisting of only borders and edges from the original image. Xoring the result and the original center pixel (Xor averaging) instead of subtracting also performs edge detection with the exception that the detected edge is not quite as clean as it is with Subtract averaging.

Other forms of pixel averaging fit themselves to unusual forms of texture and pattern generation.

The following is an example showing exactly where the subtract should appear (this holds true for all other types of fuzzing mentioned below):

P = Color assignment of original center pixel before averaging

P1 = Color assignment of new center pixel after averaging but before plotting.

Before plotting the pixel, perform this calculation:

$$P2 = P1 - P$$

And plot P2.

Edge detection is best to use on solid shapes or digitized images. If you are using it on a digitized image, it may help to reduce the noise in the picture first by Replace averaging the image before Subtract averaging. Remember, all noise in an image will show up as edges during edge detection.

Texture And Pattern Generation

Other forms of pixel averaging fit themselves to unusual forms of texture and pattern generation. Two good examples of this are Subtract and Xor averaging *on top of* the existing image. If the user Subtract averages *twice* in succession, replacing each pixel on top of the original, and then applies a grey scale to the image, the image will appear pitted and very three dimensional (much like the surface of the moon). The image can then be Replace averaged to make the features blend in and soften the image.

Xor averaging on top of the existing image also causes unusual patterns to appear. Xor averaging again does not cause the picture to revert back to normal but instead modifies it further.

Intensity Modifications

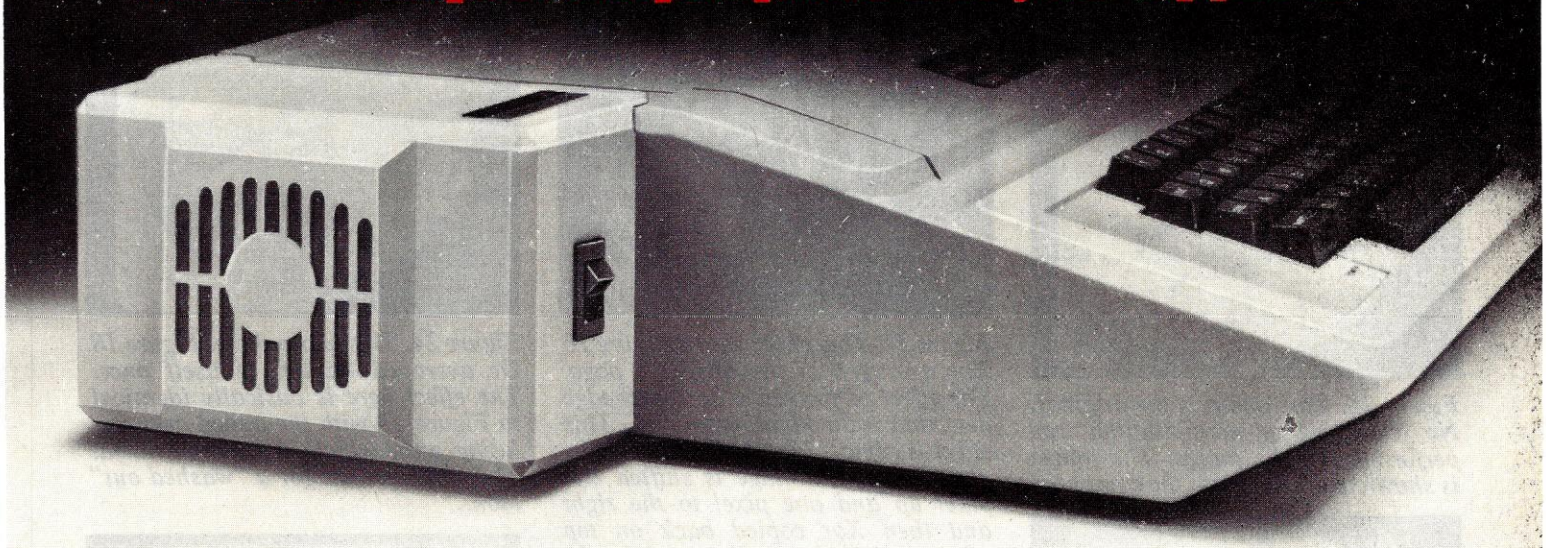
And averaging *on top of* the original image causes only the brightest shades to remain and all darker shades to be lowered in intensity. This also provides more depth (encoded via shade) to an image and is useful in intensity control.

Color Map Wraparound

Add averaging *on top of* the original image or to another area of memory causes the shades to begin to wrap

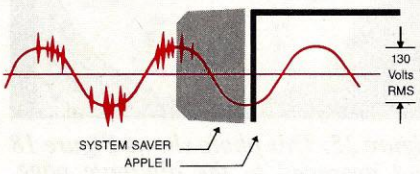
System Saver™

The most important peripheral for your Apple® II.



For Line Surge Suppression

The SYSTEM SAVER provides essential protection to hardware and data from dangerous power surges and spikes.

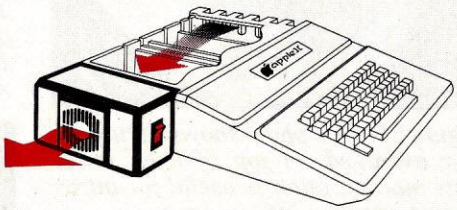


By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 Volts RMS/175 Volts dc level. 2) High frequency noise is smoothed out before reaching the Apple II. A PI type filter attenuates common mode noise signals by a minimum of 30 dB from 600 khz to 20 mhz, with a maximum attenuation of 50 dB.

For Cooling

As soon as you move to 64K RAM or 80 columns on your Apple II you need SYSTEM SAVER.

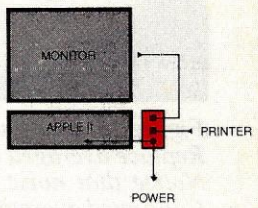
Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.

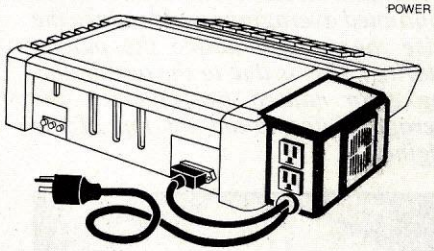


SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.

For Operating Efficiency

SYSTEM SAVER contains two switched power outlets. As shown in the diagram, the SYSTEM SAVER efficiently organizes your system so that one convenient, front mounted power switch controls SYSTEM SAVER, Apple II, monitor and printer.

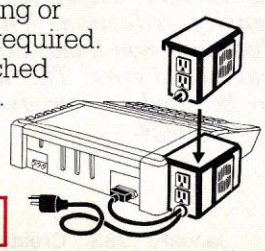




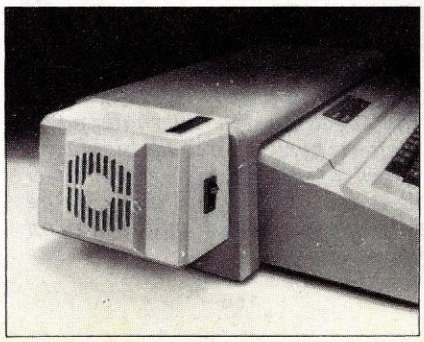
The heavy duty switch has a pilot light to alert when system is on.You'll never use the Apple power switch again!

Easy Installation

Just clips on.
No mounting or hardware required.
Color matched to Apple II.



Compatible with Apple Stand



$89.95 at your local dealer or order direct by phone or mail.
For phone or mail orders include $2.50 for handling. New York State residents add 6¼% sales tax.
VISA and MASTERCARD accepted.
Dealer inquiries invited.

Kensington Microware Ltd.
300 East 54 Street, Suite 3L
New York, NY 10022
(212) 486-2802

KENSINGTON MICROWARE

CIRCLE 190 ON READER SERVICE CARD

Figures 18-32 show how each type of averaging affects a digitized image.

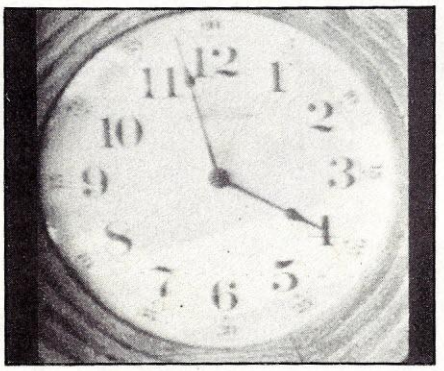


Figure 18. This photo is the original. No averaging or manipulation was performed on the image. The image is shown as it came into the computer.

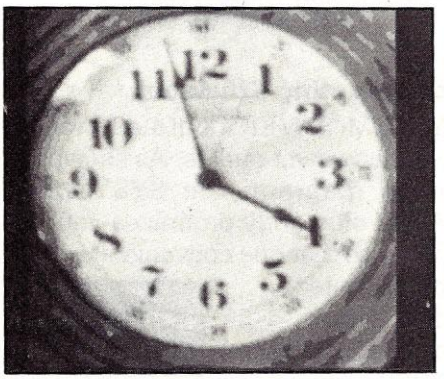


Figure 19. This photo shows Figure 18 Replace averaged on top of itself once. Notice that noise is slightly reduced. Continued averaging would reduce the noise more. Also notice the patchy coloring. This is due to the accumulating error caused by replacing the averaged information on top of the original.

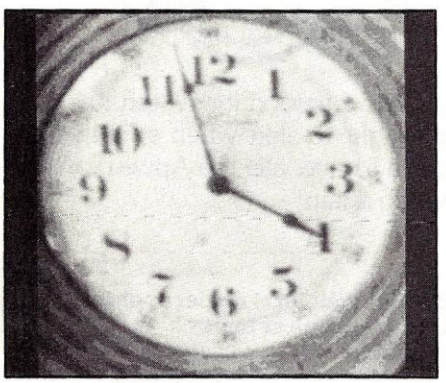


Figure 20. This photo shows Figure 18 Replace averaged to the alternate page. Notice the noise is reduced and very clean. Continued averaging would reduce the noise more and begin to make the image glow. Notice that no patchy coloring is found as there is no accumulating error.

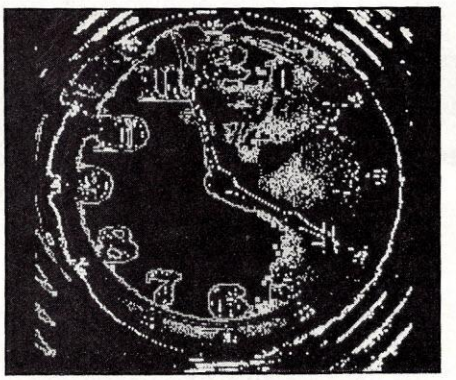


Figure 21. This photo shows Figure 18 Xor averaged to the alternate page. The effect performed is basically edge detection with shading added. This effect is almost identical to the results obtained if the image is shifted one pixel up and one pixel to the right and then Xor copied back on top of the original (as discussed in the article). This type of edge detection differs from Subtract averaging to the alternate page in that it is not as clean as Subtract averaging and produces a shaded output.

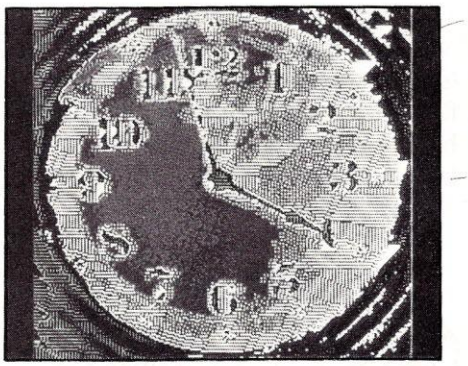


Figure 22. This photo shows Figure 18 Xor averaged on top of itself once. This manipulation is useful for introducing patterns into images.

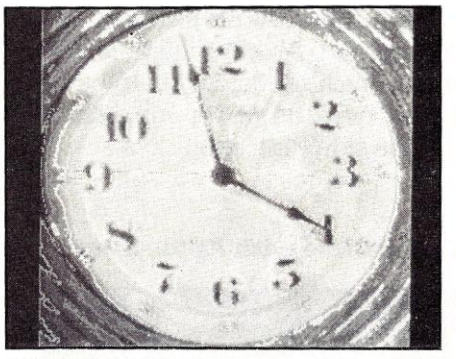


Figure 23. This photo shows Figure 18 Or averaged to the alternate page. The effect here is to add highlights to edges at angles giving the effect of light shining from an angle (more apparent on computed images than on digitized images).

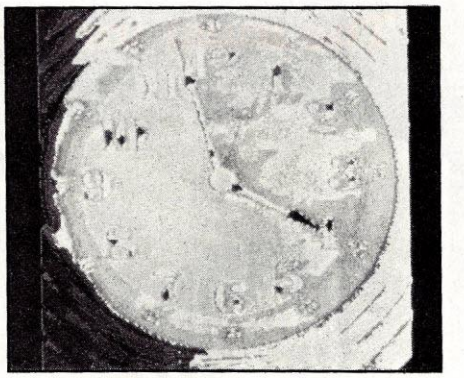


Figure 24. This photo shows Figure 18 Or averaged on top of itself once. The effect here is basically identical to Figure 23 with the added accumulating error which is greatly evident. This effect is nice for a "washed out" look.

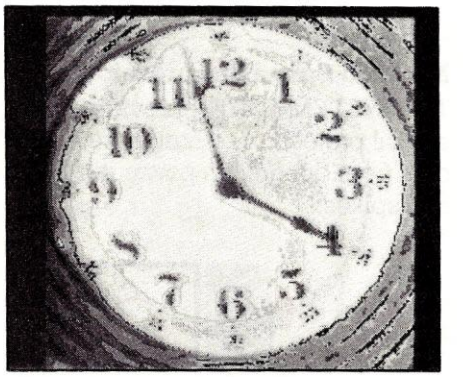


Figure 25. This photo shows Figure 18 And averaged to the alternate page. The effect here is basically the opposite of Or averaging to the alternate page. Places where Or would highlight, And will deaden.

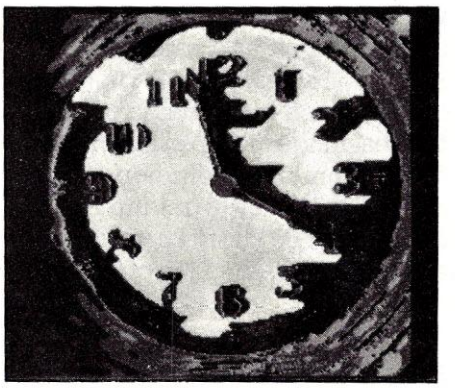
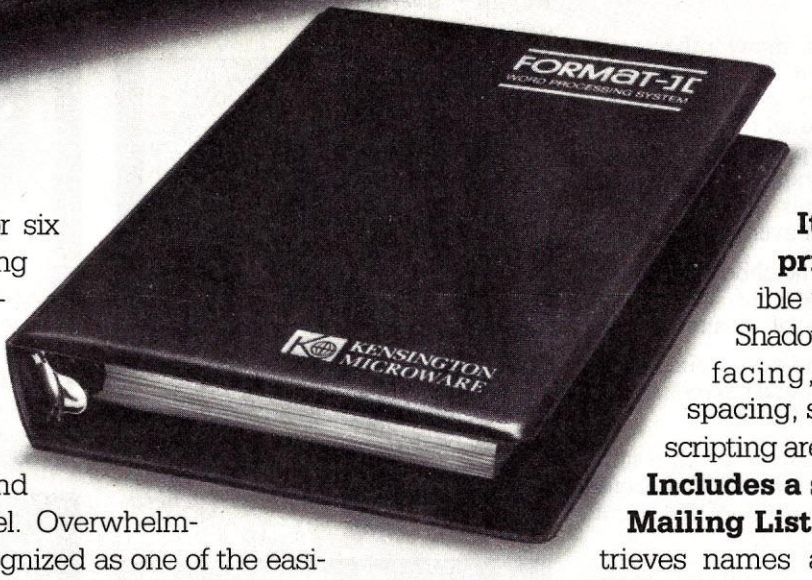


Figure 26. This photo shows Figure 18 And averaged on top of itself once. This is very useful for non-linear intensity reduction. The intensity reduction is non-linear because of the accumulated error. This method may also be used to introduce shadows into an image.

Format II.™ Word processing so advanced anyone can use it.



Format II was tested for six months in the demanding arena of Wall Street. Distributed by local dealers to law firms, financial institutions, and the like, Format II was used by secretaries and non-technical personnel. Overwhelmingly, Format II was recognized as one of the easiest and most effective word processing systems available *in any form.*

Here's why Format II is unique among word processing programs:

What you see is what you get. Format II performs virtually any editing and formatting function you can imagine and displays on the screen the text exactly as it will print out—paragraphs, underlining, justification, page breaks.

Simple to Use. You edit and format text with single key strokes. "D" for delete, "E" for edit, "I" for insert, "J" for justify, etc. Easy-to-remember commands because they make sense.

It supports all printers compatible with the Apple. Shadow printing, boldfacing, proportional spacing, sub- and superscripting are all available.

Includes a sophisticated Mailing List. Stores and retrieves names and addresses which may be printed on labels or incorporated into documents. Powerful "logic" commands allow you to select only those records which match specified criteria.

And more. Format II is lightning fast and menu driven. Add them all together and it's clear why Format II has generated such enthusiasm. Now, at a cost of $250, you *too* can buy the best.

Format II is available from most local dealers. If not, ask them to contact us, or order directly and receive a 30 day money-back guarantee.

Kensington Microware Ltd., 300 East 54 St., Suite 3L, New York, NY 10022, (212) 486-2802.

KENSINGTON MICROWARE

System Requirements: 48K Apple® II Plus with 80 column card.

CIRCLE 191 ON READER SERVICE CARD

around the color map. This effect causes bright shades to become darker and darker shades to become lighter. It differs from simply inverting the color map (or the image) by keeping the association between the color scales the same.

High Lighting

A very useful feature is Or averaging to another area of memory. If applied to a computed image (words or shapes) it causes highlights (brightest color map values) to be added to edges and corners making the image appear to gleam as if from reflected light.

If several Or averages follow each other on the same image (each time reverting to another place), and the final result is Replace averaged, the very brightest highlights will be reduced to stars.

Conclusion

While there are many other techniques which must be employed to obtain the smoothest graphics possible, pixel averaging and all of its variations provide a good stepping stone into the world of smooth graphics. The following is a list of ideas to try once you have forms of pixel averaging working:

- Average larger neighborhoods than the ones I describe here. This results in various degrees of cleaner output.
- Try averaging the center pixel along with the neighbors (just remember to divide by 9 rather than 8).
- Try using all forms of averaging mentioned in this article to become familiar with the results of the variations listed in Figure 2.
- Try combining the different forms of averaging mentioned here.
- Add new types of averaging (formula averaging where a complex formula may be executed for each pixel).
- Add the types (Replace, Subtract, Add, Xor, Or, And) to other graphic tools such as loading images from disk. Try adding the image from disk onto the screen, or subtracting or xoring.

In conclusion, the basic ideas presented in this article do not deal as much with pixel averaging as they deal with modifying a basic algorithm over and over again to provide new and diversified effects. In graphics where memory is a consideration, if the same routine can be used in many different effects, the routine becomes a valuable tool and a basis for the design of other routines using the same concepts. □

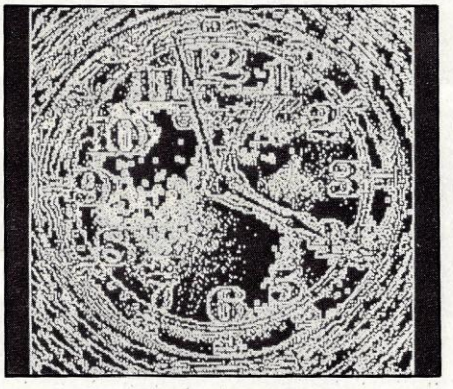


Figure 27. This photo shows Figure 18 Subtract averaged to the alternate page. The effect here is Edge Detection. Because the image contains so much noise, there are many edges detected. To reduce the number of edges, Replace average first. Figure 32 is an example of Figure 18 which has been Replace averaged before Subtract averaging.

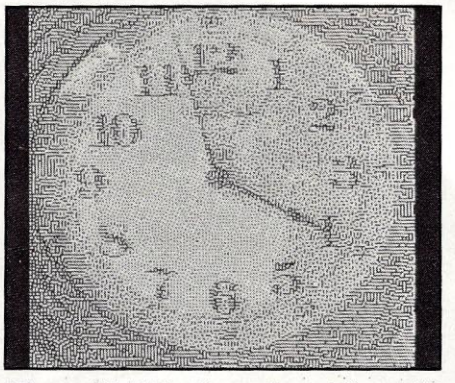


Figure 28. This photo shows Figure 18 Subtract averaged on top of itself once. This effect is useful in pattern generation and masking.

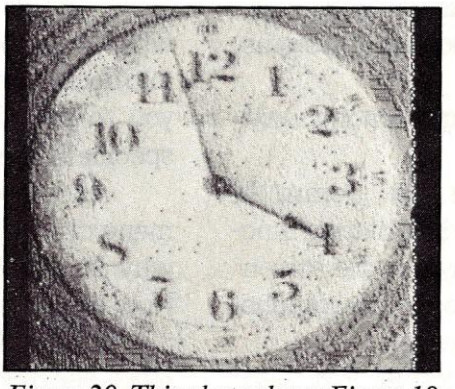


Figure 29. This photo shows Figure 18 Subtract averaged on top of itself twice. If Subtract averaging on top of the original is used an even number of times, it produces more and more three-dimensional textures. These textures appear as tiny bumps and valleys with shadows. This is a very good method of producing high-altitude type images of ground features.

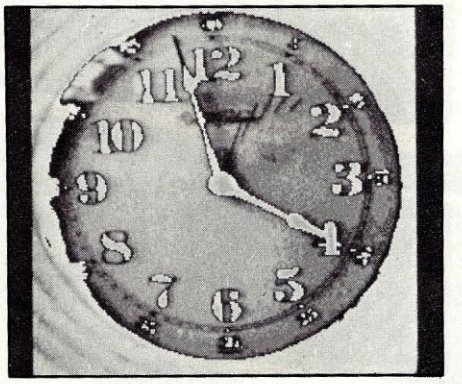


Figure 30. This photo shows Figure 18 Add averaged to the alternate page. The effect here is to wrap the pixels around the color map without adjusting it.

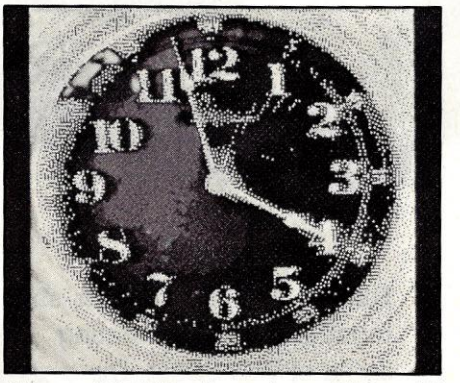


Figure 31. This photo shows Figure 18 Add averaged on top of itself once. This effect is very beautiful due mostly to the accumulated error. It is a very good effect to combine with other forms of averaging.

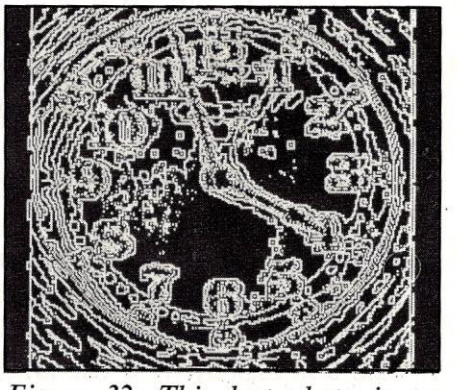
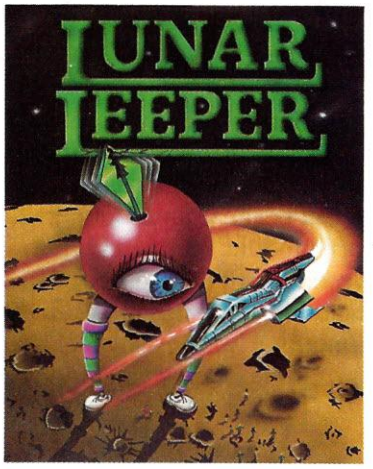


Figure 32. This last photo is an example of Figure 18 Replace averaged to the alternate page to reduce noise, and then Subtract averaged to the alternate page to edge detect. The detection here is very clean and can be made cleaner by Replace averaging several times before Subtract averaging.

JEEPERS CREEPERS!

DON'T KILL THEM LEEPERS!



Them leepers is cute.
Them leepers ain't kind.
Them leepers will jump up
and bite your behind.

Your job is to fly through
them leepers galore
to rescue some men
is the reason what for.

So be a good pilot
be quick and be sly
Don't kill the leepers
but shoot up the eye

Save all the men
and avoid all the leepers
fly through a cave
and shoot the lunar leepers keepers

If you want to know
what this silly poem's for
check out LUNAR LEEPERS
at your local computer store

Lunar Leepers is a funtastic new APPLE arcade game from CHUCKLES, creator of Laff Pak. Lunar Leepers is available for $29.95 at your local computer store or directly from:

SIERRA ON-LINE INC
36575 Mudge Ranch Rd.
Coarsegold, CA 93614
Phone (209) 683-6858

VISA MASTERCHARGE
CHECK or COD

APPLE is a registered trademark of APPLE INC.

CIRCLE 254 ON READER SERVICE CARD

SIERRAVISION

Sierra ON-LINE INC

Make the Qume Connection.™

Qume's legendary print quality is now available for your personal or small business computer with our new SPRINT®11 PLUS daisywheel printer. The secret is The Qume Connection interface module. Our first Qume Connection modules fit the most popular computers, including those from IBM, Radio Shack, Commodore, Xerox, Hewlett Packard, and North Star. Qume Connection modules for other microcomputers are on the way. You can get the SPRINT®11 PLUS that's right for your printing requirements, with a choice of 40 or 55 cps. So, make the Qume Connection by calling one of the authorized Qume distributors listed on the facing page, or by writing Qume. 2350 Qume Drive, San Jose, California 95131.

Qume®
A Subsidiary of ITT

The low cost daisywheel printer for every computer.

It's easy to make the Qume Connection.

Call the distributor nearest you to get the best quality printer for your microcomputer.

Abacus Data Services
(416) 677-9555 Ontario, Canada

Anacomp/ESCOM Division
(213) 516-7480 CA
(206) 641-4990 WA
(509) 624-1308 WA

Anthem Systems Corporation
(415) 342-9182 CA

Audio Visual Services
(713) 659-1111 TX
(800) 392-7777 TX Only

Bohlig and Associates
(612) 922-7011 MN

Butler Associates
(617) 965-1080 MA

Byte Industrial
(800) 972-5948 CA Only
(800) 227-2070 Outside CA

C&G Distributors, Inc.
(513) 435-4340 OH
(800) 245-1084 Outside OH
(412) 366-5056 PA
(800) 245-1084 Outside PA

David Jamison Carlyle Corp.
(213) 277-4562 CA
(415) 254-9550 CA
(714) 640-0355 CA
(808) 531-5136 HI
(312) 975-1500 IL
(201) 946-9669 NJ
(214) 458-0888 TX
(713) 530-4980 TX

The Computer Factory
(212) 687-5000 NY
(914) 793-1300 NY
(212) 896-0700 NY
(516) 248-6700 NY

Computing Resources, Inc.
(702) 825-8800 NV

Computer Mart of New Jersey
(201) 283-0600 NJ

Datamex Ltd.
(514) 481-1116 Montreal, Canada
(613) 224-1391 Ottowa
(416) 787-1208 Toronto
(604) 684-8625 Vancouver

Data Systems Marketing
(602) 833-0061 AZ
(714) 540-2312 CA
(213) 641-2050 CA
(415) 941-0240 CA
(916) 891-8358 CA
(213) 796-2562 CA
(213) 796-2631 CA
(714) 560-9222 CA
(213) 344-7097 CA
(209) 237-8577 CA
(303) 573-5133 CO
(303) 694-1710 CO
(313) 254-2830 MI
(406) 587-1200 MT
(505) 294-1531 NM
(503) 297-8444 OR
(412) 486-2676 PA
(214) 960-1604 TX
(713) 789-0803 TX
(801) 292-6666 UT
(206) 575-8123 WA

Data Technology Industries
(415) 638-1206 CA

Data Terminal Mart
(403) 270-3737 Alberta
(403) 420-1755 Alberta
(514) 288-1555 Montreal
(902) 469-3782 Nova Scotia
(416) 677-0184 Ontario
(416) 495-2001 Ontario
(416) 245-4780 Ontario
(613) 729-5196 Ontario
(604) 872-8482 Vancouver

Equipment Resources
(404) 955-0313 GA

General Electric
(205) 479-6547 AL
(602) 278-8515 AZ
(415) 436-9265 CA
(714) 231-0309 CA
(203) 628-9638 CT
(904) 751-0615 FL
(305) 921-0169 FL
(404) 452-4919 GA
(319) 285-7501 IA
(219) 933-4500 IN
(317) 241-9330 IN
(812) 473-6161 IN
(502) 452-3311 KY
(617) 938-1920 MA
(301) 332-4710 MD
(612) 522-4396 MN
(816) 231-6362 MO
(314) 965-7115 MO
(704) 525-3011 NC
(201) 227-7900 NJ
(518) 385-4888 NY
(716) 876-1200 NY
(513) 874-8512 OH
(503) 221-5095 OR
(901) 527-3709 TN
(214) 243-1106 TX
(713) 672-3575 TX
(801) 973-2253 UT

Gentry Associates
(305) 859-7450 FL

InterACT Computer Systems
(305) 331-7117 FL
(404) 953-8213 GA
(704) 552-7502 NC
(704) 254-1949 NC

MicroAmerica
(213) 327-6030 CA
(800) 262-4212 CA Only
(800) 421-1485 Outside CA
(617) 449-5807 MA
(800) 343-4411 Outside MA
(617) 431-7660 MA
(214) 235-3616 TX
(800) 442-5847 TX Only
(800) 527-3261 Outside TX

National Computer Syndicate
(312) 459-6400 IL

Office Systems, Inc.
(704) 374-0822 NC
(919) 274-8423 NC
(919) 549-0545 NC

PAR Associates
(303) 371-4140 CO
(801) 292-8145 UT

Pioneer Electronics
(205) 837-9300 AL
(305) 859-3600 FL
(305) 771-7520 FL
(404) 448-1711 GA
(301) 948-0710 MD
(919) 273-4441 NC
(215) 674-4000 PA

Pioneer Standard Electronics
(312) 437-9680 IL
(317) 849-7300 IN
(313) 525-1800 MI
(612) 935-5444 MN
(216) 587-3600 OH
(513) 236-9900 OH
(412) 782-2300 PA
(512) 835-4000 TX
(214) 386-7300 TX
(713) 988-5555 TX

Schweber
(205) 882-2200 AL
(408) 496-0200 CA
(213) 537-4321 CA
(916) 929-9732 CA
(213) 999-4702 CA
(203) 792-3500 CT
(305) 927-0511 FL
(305) 331-7555 FL
(404) 449-9170 GA
(319) 373-1417 IA
(312) 364-3750 IL
(617) 275-5100 MA
(301) 840-5900 MD
(313) 525-8100 MI
(612) 941-5280 MN
(201) 227-7880 NJ
(516) 334-7474 NY
(716) 424-2222 NY
(216) 464-2970 OH
(513) 439-1800 OH
(918) 622-8000 OK
(215) 441-0600 PA
(412) 782-1600 PA
(713) 784-3600 TX
(214) 661-5010 TX
(512) 458-8253 TX
(414) 784-9020 WI

Tek Aids Industries Inc.
(312) 870-7400 IL
(512) 835-9518 TX

Terminal Rentals
(602) 258-4466 AZ
(714) 832-2414 CA
(408) 292-9915 CA
(213) 637-3413 CA
(714) 235-9268 CA
(415) 956-4821 CA

Terminals Unlimited
(800) 336-0423

Unico
(512) 451-0251 TX

Western New York Computer
(716) 381-4120 NY

Qume®
A Subsidiary of ITT

CIRCLE 242 ON READER SERVICE CARD

Pixel Averaging, continued...

Table 2.

Type	Result Same Image	Result Other Area
Replace	Noise reduction	Glows and noise reduction
	Jaggie reduction	Jaggie reduction
Subtract	Texture generation	Edge detection
Xor	Pattern generation	Shaded edge detection
Or	Highlighting	Highlighting
And	Intensity reduction	Anti-OR to alternate page
Add	Map control	Map control

Listing 1.

```
C..
C..  This is a sample FORTRAN program which will take an entire screen and
C..  pixel average it using REPLACEMENT AVERAGING.
C..
      INTEGER X,Y,X1,Y1,L,AVE,COLOR
      INTEGER FRIEND (2,8)
C..
C.. Data
C..
      DATA FRIEND/-1,1,0,1,1,1,-1,0,1,0,-1,-1,0,-1,1,-1/
C..
C.. Here we begin to scan the entire screen.  Notice that while the screen
C.. resolution is 378 by 241, our loops only run from 2-377 by 2-240.  The
C.. reason for this is that the very outside border on the screen has neighbors
C.. which are off the screen, so to avoid possible error, we do not average
C.. them.
C..
      DO 120 X = 2,377
         DO 110 Y = 2,240
C..
C.. First, set the average equal to zero.
C..
            AVE = 0
C..
C.. Next we begin to look at a neighborhood.  The neighbor's offsets are held
C.. in an array called FRIEND where:
C..
C..               FRIEND (1,n) = X offset
C..               FRIEND (2,n) = Y offset.
C..                  n  = 1 to 8 (Corresponding to the 8 neighbors)
C..
C.. XREAD will return the COLOR (0-15) of point at X1 and Y1 on the screen.
C..
            DO 100 L = 1,8
               X1 = X + FRIEND (1,L)
               Y1 = Y + FRIEND (2,L)
               CALL XREAD (X1,Y1,COLOR)
               AVE = AVE + COLOR
  100       CONTINUE
C..
C.. Now caculate the average by COLOR = AVERAGE/NUMBER OF NEIGHBORS
C.. And replot the color at X and Y (Using XDOT)
C..
            COLOR = AVE / 8
            CALL XDOT (X,Y,COLOR)
C..
C.. End our loops
C..
  110    CONTINUE
  120 CONTINUE
      STOP
      END
```

"Now that I finally made it to 'star commander' in star raiders...life just doesn't seem to have any meaning."

Part 1: Making Images With Depth

STEREO GRAPHICS

John D. Fowler, Jr.

Remember 3-D movies? I still remember slinking down in my seat at the local theater, fearing that if those bats floating out over the audience didn't get me, the falling rocks would. And then there were 3-D comics with the funny red and green glasses. The pictures seemed to stand out from the page. How did they work?

Our ability to perceive depth in the world around us stems primarily from two factors: perspective and the relative angle of view between the viewer's eyes. An example of the former is the apparent convergence of parallel lines which extend to the horizon. We are conditioned to believe that the lines really don't get closer together but rather are extending away from us in depth. This use of perspective is what allows pictures of objects projected onto a flat page or screen to give the illusion of depth.

But another and more convincing sense of depth comes from the positioning of the eyes. If you must cross your eyes to focus on something, then you know it must be very close. This is why there can be no doubt in your mind when you see a 3-D movie that it is different from a regular movie, even though both are projected onto a flat screen.

The difference between perspective and depth perception in pictures is that perspective requires only one image, but it takes two separate images to create a really convincing sense of depth. This is directly related to the fact that you have two eyes in the front of your head. This ability to perceive how far away an object was proved to be a great headache-preventer for our tree-dwelling ancestors.

If you want to create an image, a mirage if you will, out of flat paper, then you must do two things: draw two images in perspective, and assure that each eye sees only the appropriate image. In 3-D movies this is accomplished by projecting both images onto the same screen, in more or less the same place.

For color movies, two projectors are used. The images are sorted out by the use of polarizing filters over the projector lenses and similarly-oriented filters in the glasses you must wear. The light coming from the right projector, for example, is horizontally polarized and the light from the left is polarized vertically. Then the filter over your right eye, which is horizontally polarized, passes light only from the right projector and that eye sees only the image intended for it. The rest of the light on the screen shows up in your left eye and, *voila*, each eye receives the intended image. Your brain, working on these images, notices the similarities (and vital differences) and forces you to duck when those bats come fluttering out over the audience.

If you put the glasses on upside down, so that the images go to the wrong eyes, you can still see the picture, but the essential depth information no longer corresponds to experience. The picture looks strange in a way that is difficult to describe, and no longer gives the proper illusion of depth.

Non-color 3-D movies and comics work on the same principle, but use red and cyan (sort of greenish blue) colors and filters. Red and cyan are complementary colors. A red line can't be seen through a red filter (because it looks just like the red background), but a cyan line looks black. And vice-versa for the cyan filter. So one eye gets the red image and the other eye the cyan.

The real problem in making your own stereo pictures with a computer comes in getting the proper image to the proper eye. Several possible methods will be discussed.

If you have two slide projectors and the equipment to photograph your display, you can buy some polarizing filters and do it as in the movies: properly oriented filters over each lens with corresponding filters over the eyes. Or, if you are satisfied with red and cyan images and want to experiment with different colored pens and filters, you can do it that way. But beware: light blue pens are hard to find.

John D. Fowler, Jr., 946 Capulin Road, Los Alamos, NM 87544.

"The key to developing your own courseware is a good authoring system."

—Dr. Dan Gibbs, Consultant
Radio Shack Education Division

"I recommend Radio Shack's TRS-80® AUTHOR I." And with good reason. AUTHOR I enables any teacher to easily create effective computer assisted instruction materials. And, Dr. Gibbs adds, "No programming experience is required!"

"Courseware developed by *teachers* is more effective. An authoring system is a means of preserving the instructional validity of courseware, because it allows the courseware to carry the indelible mark of an educator on it. Teachers implement their special knowledge of subject matter in their field—as opposed to a computer programmer who isn't an educator."

"AUTHOR I's powerful text/graphics editor allows a teacher to work quickly." But not at the expense of aesthetic quality. Using both text and graphics, you design your screen complete with subject explanations, study hints, and questions for students to answer. You can set up a glossary, include positive and negative feedback messages, determine the number of tries allowed the student per question, even print student scores and timing. Don't worry about mistakes, either. AUTHOR I's full-screen editing feature makes changing your text quick and easy.

"You'll find the branching concept very useful—I did." Dr. Gibbs implemented Radio Shack's microcomputer version of the Philadelphia City School District's Computer Assisted Reading Development program (C.A.R.D.). AUTHOR I let him set up different paths in a lesson. The computer would automatically branch students to follow the appropriate path as determined by each student's performance on key questions. Branching can be done within a single lesson, as well as to other lessons or non-AUTHOR I programs.

"Best of all, it's at the right price for any classroom." TRS-80 AUTHOR I (Cat. No. 26-1727) is only $149.95. It requires a low-cost 32K TRS-80 Model I or Model III disk system. Stop in today at a Radio Shack Computer Center, store or participating dealer near you. Or talk with your Educational Coordinator.

For the name of the full-time Educational Coordinator in your area, call Radio Shack's Education Division at 800-433-5682 toll-free. In Texas, call 800-772-8538.

Radio Shack®

The biggest name in little computers™

A DIVISION OF TANDY CORPORATION

Retail prices may vary at individual stores and dealers.

CIRCLE 243 ON READER SERVICE CARD

Stereo Graphics, continued...

Colored and polarizing filters can be purchased at a photographic supply store.

Another approach is to use lenses. You have probably seen the stereo viewers on the market. They have two lenses through which you can view images from disks containing small pieces of film which are inserted into the viewer. You must make the center-to-center distance of the images less than the distance between your eyes. This means that the images must be rather small. A viewer can be made by placing a small magnifying glass in front of each eye.

There is another method which requires no extra equipment at all. The drawback to this method is that it takes a degree of voluntary control over the eye muscles which some people lack. If you can make your eyes diverge slightly (the opposite of crossing them), you can try pointing your left eye toward the left member of an image pair and the right eye towards the right image. If you can still focus on the images, you've got it made. You also have a rare talent because very few people can do this.

A variation of this method is to cut out the images and reverse them, so that the image intended for the left eye goes on the right. The trick now is to cross your eyes slightly so that the left eye sees the right image, and vice-versa. One aid in doing this is to cup your hands a few inches in front of your face and look through the hole. Or you can cut a rectangular hole in a piece of cardboard and view the images through it.

The real problem in making your own stereo pictures with a computer comes in getting the proper image to the proper eye.

The problem that most people encounter with these methods is that there exists a semi-voluntary coupling mechanism between the interocular muscles (the ones that control the relative angles of your eyes) and the muscles which focus the eyes. You must focus on an image (really two images) which are farther away than your interocular muscles are telling your brain they should be. Some people can do this and some can't. If all this leaves you dizzy, then go on to the next method, which works for almost everyone.

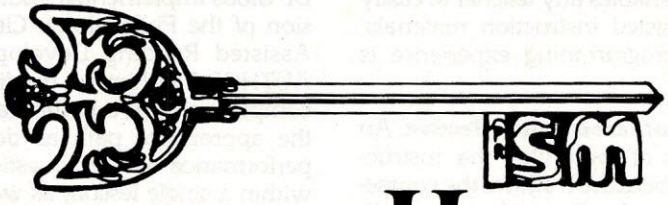
Perhaps the best way to view stereo images is through an inexpensive viewer made from cardboard and mirrors. To construct the viewer, you will need four small rectangular mirrors (approximately 1½" x 2"), some sturdy cardboard, double-stick tape, and glue. The pocketbook mirrors, which can be found at a variety store, will do nicely. You may have to remove the plastic cases by boiling them to loosen the glue. Heavy-duty photographic mounting board works well for building the frame. In addition, you will need some small strips of wood or plastic for sturdiness and to form the necessary 90 degree angles. I used decorative molding strips for this.

Construct the viewer, as shown in Figure 1, by first cementing the rear short sides of two of the mirrors to a piece of molding strip to form a right-angle V. Next glue a piece of molding strip to the back side along one of the long edges of each of the other two mirrors. While the glue is drying, you can cut two pieces of cardboard to the

ISM

« A Puzzle Where Fantasy Becomes Reality And Wealth Awaits the Clever »

ISM



The hunt is on for three priceless gold keys hidden somewhere in the continental U.S. The story is Prism , a heroic fantasy Storydisk™ that tells of a young boy's quest to retrieve the magical keys. Also within Prism are the clues and riddles that lead to the unknown whereabouts of the lost keys. The tale comes alive for you through screens of text, colorful animated graphics and special sound effects.

Hidden in three separate locations are a *diamond* key, a *ruby* key, and a *topaz* key (all keys are made of *solid gold*). A surprise climax to the adventure will also be revealed when all three keys are cleverly recovered. The entire family will enjoy the puzzle hidden in the entertaining story of Prism , and trying to find and solve the many clues. The keys are waiting for their future owners.

PRISM

• Read the story • Solve the clues • Find the keys

is contained on a Storydisk™, a new software concept from ISM

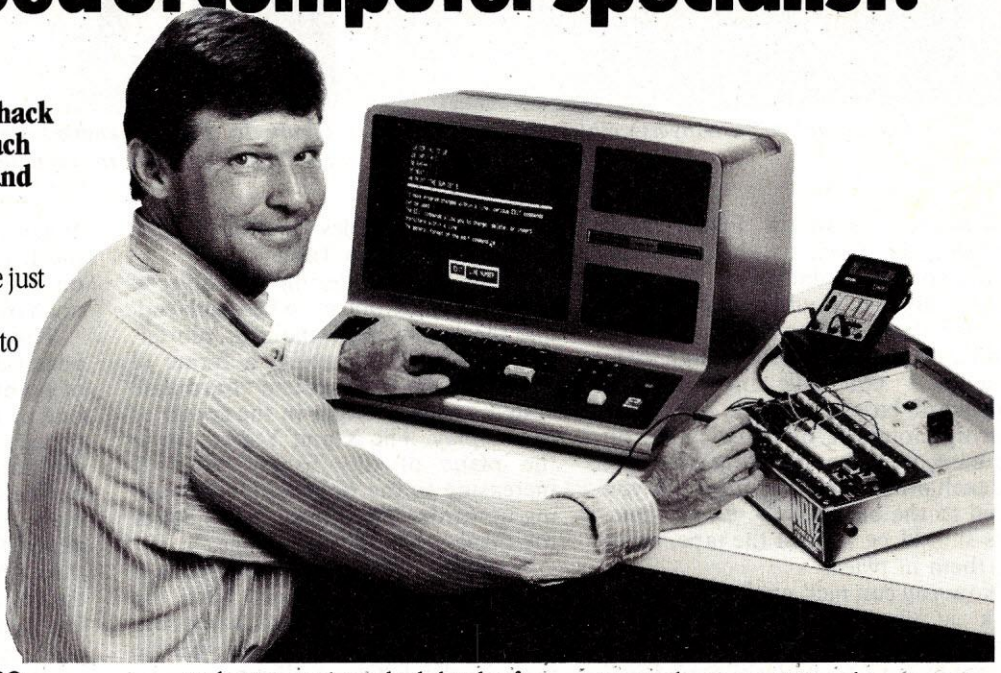
available on: Apple II and II+ · IBM PC · Atari

MatheMagic, GRAPHMAGIC and PRISM are all ISM products

write or call at:
International Software Marketing
Suite 421, University Building
120 E. Washington Street
Syracuse, New York 13202
(315) 474-3400

CIRCLE 187 ON READER SERVICE CARD

Now NRI takes you inside the new TRS-80 Model III microcomputer to train you at home as the new breed of computer specialist!



NRI teams up with Radio Shack advanced technology to teach you how to use, program and service state-of-the-art microcomputers...

It's no longer enough to be just a programmer or a technician. With microcomputers moving into the fabric of our lives (over 250,000 of the TRS-80™ alone have been sold), interdisciplinary skills are demanded. And NRI can prepare you with the first course of its kind, covering the complete world of the microcomputer.

Learn At Home in Your Spare Time

With NRI training, the programmer gains practical knowledge of hardware, enabling him to design simpler, more effective programs. And, with advanced programming skills, the technician can test and debug systems quickly and easily.

Training includes the TRS-80 Model III microcomputer, professional LCD multimeter, the NRI Discovery Lab, Computer Assisted Instruction programs and hundreds of demonstrations and experiments.

(TRS-80 is a trademark of the Radio Shack division of Tandy Corp.)

Only NRI gives you both kinds of training with the convenience of home study. No classroom pressures, no night school, no gasoline wasted. You learn at your convenience, at your own pace. Yet you're always backed by the NRI staff and your instructor, answering questions and giving you guidance.

You Get Your Own Computer to Learn On and Keep

NRI training is hands-on training with practical experiments and demonstrations. You don't just program your computer, you go inside it...watch how circuits interact...interface with other systems...gain a real insight into its nature.

You also work with an advanced liquid crystal display hand-held multimeter and the NRI Discovery Lab,® performing over 60 separate experiments. Both microcomputer and equipment come as part of your training for you to use and keep.

Computer Assisted Instruction

Your TRS-80 even helps train you. You receive 8 special lesson tapes in BASIC computer language. Using them in your microcomputer, you "talk" to it as you progress. Errors are explained, graphics and animation drive home key points. Within a matter of minutes, you'll be able to write simple programs yourself.

Send for Free Catalog... No Salesman Will Call

Get all the details on this exciting course in NRI's free, 100-page catalog. It shows all equipment, lesson outlines, and facts on other electronics courses such as Electronic Design, Industrial Electronics, TV/Audio/Video Servicing... 11 different career opportunities in all. Keep up with the latest technology as you learn on the latest model of the world's most popular computer. If card has been used, write to:

NRI McGraw-Hill

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.

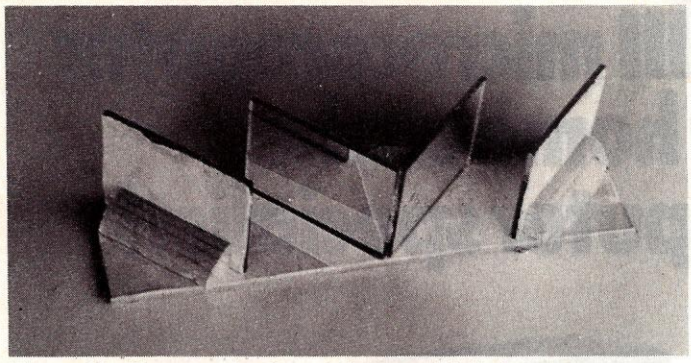


Figure 1b. Photograph of partially assembled viewer.

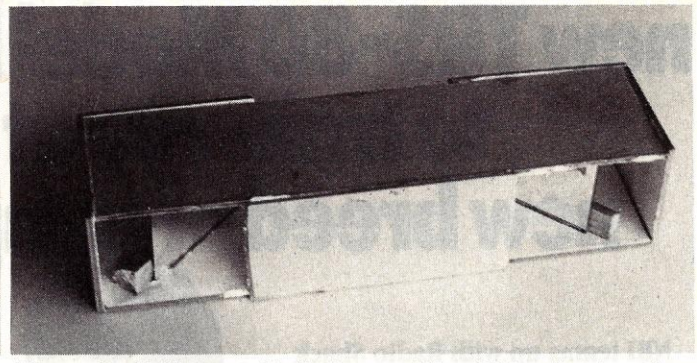


Figure 1c. Fully assembled viewer with additional strips of cardboard on sides to exclude light.

dimensions shown in Figure 1(a). Transfer the lines, as shown in the figure, to one of the pieces, then put down a layer of double-stick tape.

After the glue has dried, take the middle pair of mirrors, and align them with the V you have drawn on the cardboard base. Place the outer two mirrors along the other two lines on the base, with the reflecting sides facing each other. The molding strips you glued to the bases of these outer mirrors should be against the tape, holding them in place.

Now you can pick up the viewer and look at the stereo figures which accompany this article. You will probably have to make slight adjustments in the mirror positions to get the images to line up and appear as one. This is the reason for using the double-stick tape. Take your time and get the mirrors just right, so that you comfortably see a single 3-D image. (You will also be able to see other images from unwanted reflections, but we will take care of them shortly.)

When everything is lined up, put on the top piece of cardboard and glue the mirrors in place. Finally, as shown in Figure 1(b), you should apply cardboard wherever possible to the four sides of the viewer to keep out extraneous light (without, of course, obstructing the view of the images you want to see).

In what follows, we will go through the steps required to write your own programs and make stereo images like those shown here. I will give you the subroutines and main programs you will need, except for the plotting routine.

The statement GOSUB PLOT probably won't work on your system. In place of PLOT you must insert the line number for your plotting subroutine. In most cases, the plotting subroutine will be quite simple: a command to draw a straight line from one point to another, followed by a RETURN statement. Variables used in the listings are defined in Table 1.

We will be considering three objects: the viewer, the object to be displayed, and the display itself (monitor, plotter, or printer). To establish a frame of reference, we will create a coordinate system with its origin in the center of the display. The X and Y axes are in the plane of the display, with X increasing to the right and Y increasing upwards. The Z axis comes out of the display toward the viewer.

As shown in Figure 2, the axes are labeled with capital letters, while the coordinates of objects use lower-case letters. (Only capital letters will be used in the listings.) Viewer coordinates are (x, y, z), coordinates of points in the object to be plotted are (a, b, c), and points on the display surface are labeled (m, n, o) or just (m, n) since the Z coordinate always equals zero on the display surface.

For the time being, let's content ourselves with producing a single image on the display. (After this has been accomplished, it will be easy to produce two images, one for each eye.)

Pretend that you are holding a pencil in front of your display and that when you remove it, you want an exact image of the pencil as you saw it to remain on the display. To do so, we must draw an image on the display, corresponding to the original "real" image of the pencil, which was displayed on the backs of your eyeballs. When the pencil is removed and only the display remains, we want the image on the back of your eye to remain unchanged.

This can be done by thinking of the pencil as being made up of a bunch of points each of which is transferred, one at a time. For each point on the pencil, we want to set the corresponding point which is directly behind it on the display. This point on the display can be found by extending a straight line from the viewer's eye, through the point on the pencil, to the display. Do this for each point on the pencil, and when you remove it your eye will see the identical image on the display. (Note in what follows that the pencil could just as well be behind the display as in front of it.)

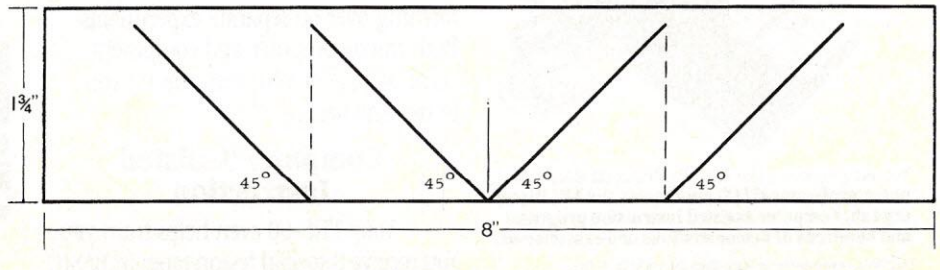
What we have to know to get the computer to do this, is a mathematical relation between the point at which the viewer exists, the points which make up the pencil, and the corresponding points on the display. Figure 2 shows a stereo view of just one point and the projection from the eye through the point to the screen. Looking down from above, as in Figure 3, we can see that for X coordinates the needed relation between viewer, object, and display is expressed by the equation:

(1a) m=a+(a-x)*c/(z-c).

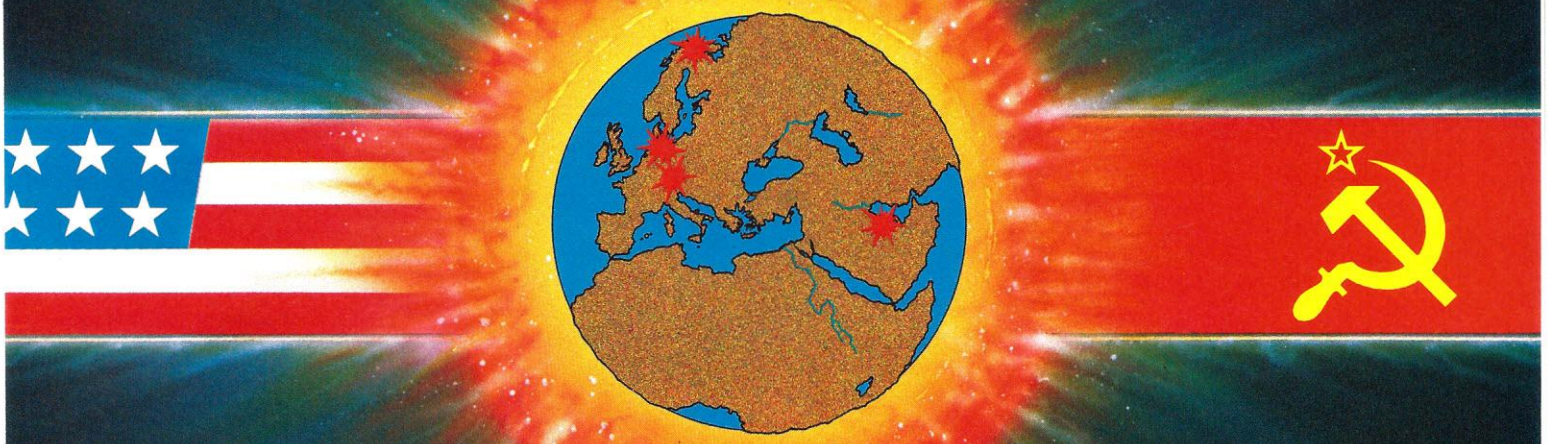
Likewise, if we were to view the figure from the side, it would be apparent that for Y coordinates the equation is:

(1b) n=b+(b-y)*c/(z-c).

Figure 1a. Viewer template. Lines at 45° angles should be one mirror length.



1985 WAS NOT A VERY GOOD YEAR. THE RUSSIANS INVADED GERMANY, STORMED THE PERSIAN GULF, ATTACKED NORWAY, AND OVERRAN THE BALTIC.



INTRODUCING OUR NEW SERIES OF WARGAMES:
WHEN SUPERPOWERS COLLIDE!

SSI has just turned the Cold War into a very hot one. We've produced an entire line of wargames under the title: WHEN SUPERPOWERS COLLIDE. Each game in the series presents a different scenario of probable U.S.-Russia confrontations in various parts of the world.*

The first four releases are ***GERMANY 1985,™ RDF™*** *(in the Persian Gulf),* ***NORWAY 1985,™*** *and* ***BALTIC 1985.™***

Designed by Roger Keating, creator of SSI's highly-acclaimed SOUTHERN COMMAND,™ these strategy simulations boast the same successful look and play as his previous masterpiece: beautiful color graphic displays, easy-to-use movement system and realistic combat rules.

In GERMANY 1985, battalions of Soviet infantry, tanks, artillery units, and paratroopers have breached the southern center of West Germany through the Fulda Gap. NATO forces must contain and repel the Red invasion.

We've introduced several innovative rules to this game: Speed of movement is inversely proportional to the number of enemy units that can see you; smoke screens can be called upon to help cover an attack or retreat; and the concepts of HQ units, divisional integrity, and air superiority are fully incorporated.

For improved playability, the computer can actually move and fire for you. For example, if you wish to move from point A to B, simply order the computer and it will move the designated units along the most efficient path — stopping whenever enemy units are encountered. Or you can have the computer direct your artillery fire for you. In the solitaire mode, the computer can play either the Soviet or U.S. side.

GERMANY 1985 (at $59.95) is more than the standard bearer for our new series. Its rulebook contains all the rules for the rest of the line....which are priced at just $34.95 each! What you've got are four great modern wargames at unbeatable prices!

To see how you can decide the outcome of battle when superpowers collide, look for GERMANY 1985™ and company at your local game/computer store today!

**48K disc for the Apple® II with Applesoft ROM card.*

SSI

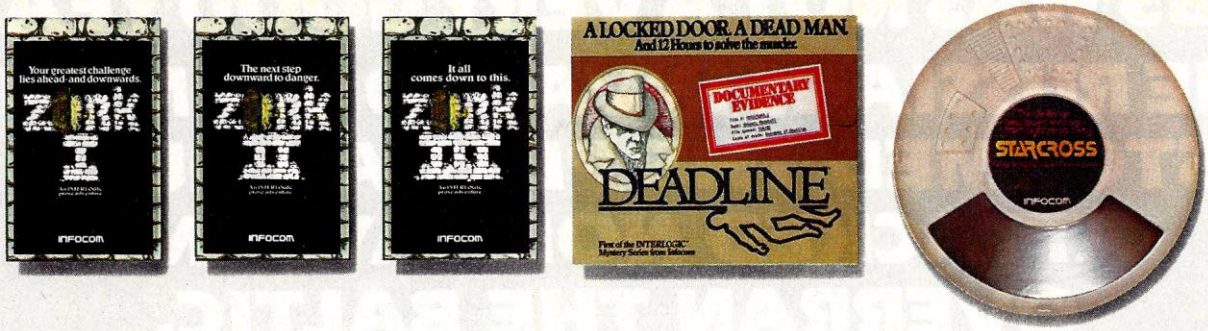
Apple is a registered trademark of Apple Computer Inc.

STRATEGIC SIMULATIONS INC

As part of our demanding standards of excellence, we use maxell floppy discs.

If there are no convenient stores near you, VISA and M/C holders can order direct by calling **800-227-1617, ext. 335 (toll free).** *In California, call 800-772-3545, ext. 335. To order by mail, send your check to: Strategic Simulations Inc, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. (California residents, add 6.5% sales tax.)* ***WRITE FOR A FREE CATALOG OF ALL OUR GAMES.***

CIRCLE 340 ON READER SERVICE CARD



WE'RE WRITING

THEM AS FAST AS WE CAN!

At the rate we're going, we'll have these pages filled by 2083. And by 2084, people will be clamoring for the next Infocom creation.

We hate to disappoint our public. So we keep you waiting. Because while the software factories are cranking out arcade game after arcade game, pulpy adventure after trite fantasy, we're writing and rewriting, honing and perfecting. Before a single person enters one of Infocom's worlds, it must be crafted into a living, riveting, definitive experience.

Judging from the public's reaction, it's worth the wait. For instance, *Creative Computing* welcomed DEADLINE™ as "thoroughly engrossing and realistic," while a *Softalk* readers' poll recently voted ZORK™ I and ZORK II the most popular adventures of 1981.

And now, for the moment, your wait is over. ZORK III, your final step in the underground trilogy, and STARCROSS,™ an exploration of a new dimension in science fiction, are ready for you.

Look at them up there, the little worlds of Infocom. As our universe expands, companions will come to help fill that vast expanse of white space. Till then, they'll continue to stand alone as the best of all possible worlds.

INFOCOM™

55 Wheeler Street, Cambridge, MA 02138

Infocom's worlds are available for Apple,® Atari,® IBM, TRS-80,® Commodore, NEC, Osborne, CP/M,® and DEC.™

Apple is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari, Inc. TRS-80 is a registered trademark of Tandy Corporation.
CP/M is a registered trademark of Digital Research, Inc. DEC is a trademark of Digital Equipment Corporation.

As we celebrate our first anniversary, Gold Disk™ wishes to say *THANK YOU* to the thousands of Apple™ users that have taken advantage of our buying opportunities and service features. Gold Disk™ also thanks the hundreds of vendors and publishers that stand behind us and support our customers.

Gold Disk™ is meant to be the highest quality telemarketing/mail order experience available for the Apple™ user. We are constantly upgrading our catalog of products and improving our level of service.

You can (occasionally) find lower prices. You cannot find a higher order of professional commitment or dedication to serving its customers than Gold Disk™.

To celebrate our first year anniversary we are offering a number of specials on selected products. Call Gold Disk™ for quotations toll-free 1-800-368-2260 (in Maryland 592-5949).

Congratulations To Four More Software Winners From Our Free Drawing at the Boston Applefest:

P. Di Bara, Massachusetts J. Bierly, New Jersey R. Bailey, North Carolina G. Omer, Florida

Gold Disk™

APPLE SOFTWARE
APPLE ACCESSORIES
CALL TOLL FREE

FREE DATA DISK WITH EVERY $49 PURCHASE!

For specific software not listed, CALL 1-800-368-2260

Free Catalog.

Look over the list of product lines we carry and call us when you need a quote on a specific product.

Info Unlimited,
Easywriter (PRO)

Microsoft Z-80 Softcard ..
Microsoft 16K Ramcard ..
Videx Videoterm .....

Corvus SOFTWARE

Smartmodem

- Auto-Answer • Auto-Dial • Repeat
- Programmable - Use Any Language
- Touch-Tone and Pulse Dialing
- Audio Monitor - Listen to Connection
- FCC-Approved Direct-Connect
- Full or Half Duplex, 0-300 Baud
- RS-232C Interface • 7 Status LED's
- Two Year Limited Warranty

Just some of the software in stock NOW–
Magic Window, Raster Blaster, Ultima, Home $ Minder, Tax Preparer, Pool 1.5, Typing Tutor, Olympic Decathalon, ABM, Robot War, Castle Wolfenstein, Cranston Manor, Expediter, OO-Topos, Cyborg, Gorgon, Falcons, Wizardry, Personal Filing System, PFS: Report, Flight Simulator. . .

TG Products
JOYSTICK

OTHER BRANDS IN STOCK:
Accent, Adventure International, Astar, Auto. Sim., Avalon, Avant-Garde, Beagle CPU, Datasoft, Delta, Edu-Ware, Info Com, Lazer, LJK, Phoenix, Quality, Sensible, Sentient, Sirius, Strategic, Synergistic and United.

*APPLE IS A TRADEMARK OF APPLE COMPUTER INC.

WE ALSO CARRY I.B.M. EXPANSION CARDS, SERIAL CARDS, AND OTHER ACCESSORIES... Call to inquire about specific products

This month we are featuring specials on MICROTEK 16K BAM-16 Memory Expansion Boards, VIDEX Videoterm Boards, LEADING EDGE Elephant Memory Disks, and KENSINGTON System Savers...

Call 1-800-368-2260 (In Md. 592-5949)

APPLE SOFTWARE
APPLE ACCESSORIES
CALL TOLL FREE

TOLL FREE ORDER
1-800-368-2260 (In Maryland, Call 592-5949)
For specific software not listed, CALL 1-800-368-2260

TRADE THIS: /SS /IC /F$ /E " !
(Multiple strokes)

FOR THIS: SAVE | Insert Column | Format $ | EDIT | Label | RECALC
(Single stroke)

KEY WIZ™

BREAKS THE KEY/CODE BARRIER

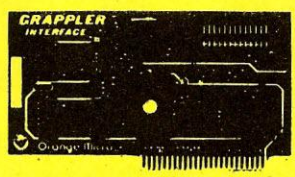
- A plug in keyboard relief to Visicalc* users

*Visicalc is a registered trademark of Personal Software
*Apple II is a registered trademark of Apple Computer, Inc.

HAYES MODEMS

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Attach SYSTEM SAVER to your Apple II



The most intelligent Apple Interface available. EPROM chip makes high-resolution graphics easy. Versions to accommodate the Anadex, Epson Series*, IDS Paper Tigers, Centronics 739, NEC 8023, C. Itoh Prowriter, Okidata Series* and more.

*Requires Graphics Upgrade.

RanaSystems

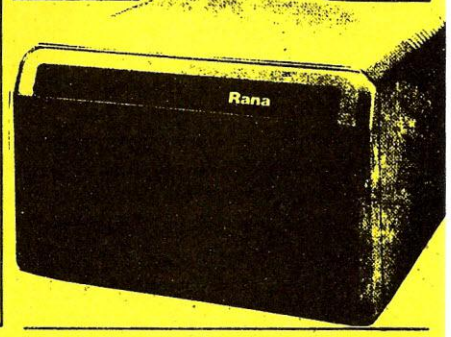
Your Apple computer can grow from ordinary to awesome in a matter of minutes.

The Elite disk drive Series by Rana Systems *gives* you that kind of magic. Quickly, easily and cost-effectively.

This superb family of sophisticated floppy drives was designed and perfected by a team of industry-respected engineers expressly for Apple® computer owners who have long been demanding more disk drive for their money.

Now they *have* a drive that makes an Apple perform the way it should. For example;

Elite One, the most economical Rana drive, delivers 15% more storage capacity than Apple's drive. The top-of-the-line Elite Three will provide an astonishing *four-times* more storage, approaching hard disk performance. It's done through exclusive high-density single and double-sided disks and heads.



SPECIAL OF THE MONTH

16K Ramcard
100.00

- Full 1 year warranty
- Top quality — gold fingers
- Expand Apple II 48K to 64K
- Compatible with Z-80 Softcard™
- Allows system to run with CP/M™, PASCAL, DOS3.3, COBAL, Visicalc, etc.

ONE FULL YEAR WARRANTY

Provides 16K bytes of additional RAM for Apple II or Apple II Plus.
Designed for use with Apple II with 48 bytes of RAM already in place.

1-800-368-2260 (In Maryland, Call 592-5949)

GOLD DISK™ Software
Box 102
Glen Arm, Md. 21057
TOLL FREE 1-800-368-2260

VISA MasterCard

THANK YOU.

Visicalc is a trademark of VisiCorp.
Z-80 is a trademark of Zilog, Inc.
Apple II is a trademark of Apple Computer, Inc.
Softcard is a trademark of Microsoft Inc.

*APPLE IS A TRADEMARK OF APPLE COMPUTER INC.

CIRCLE 178 ON READER SERVICE CARD

And that's all there is to drawing perspective images. You put in a coordinate for the viewer (x, y, z) and a series of coordinates for the object (a, b, c) (or let the computer calculate them), and then plot the resulting m and n (horizontal and vertical) numbers on the display.

That was so easy, let's try something else before getting to the stereo part. How about rotating the object before plotting it? Once again, since objects can be thought of as sets of points, we need only consider how to rotate a single point about each of the axes.

In Figure 4, we see the result of rotating a point about the Z axis. Using a little trigonometry, and calling the rotated point (a1, b1, c1) we get:

a1 = a*cosθ - b*sinθ,
b1 = a*sinθ + b*cosθ, and
c1 = c.

If we now use a1, b1, and c1 in equations 1(a) and 1(b), instead of a, b, and c, the projection of the object onto the display will be rotated by the angle θ.

To rotate about the X and Y axes, you do the same things to the b and c coordinates or to a and c. Putting all of this together, we arrive at the Master Rotation-Perspective Subroutine which starts at line 1000 in Listing 1.

Since this subroutine will be executed a great many times, it is desirable to make it run as fast as possible. Thus, the sines and cosines of the rotational angles are calculated only once, near the beginning of the program.

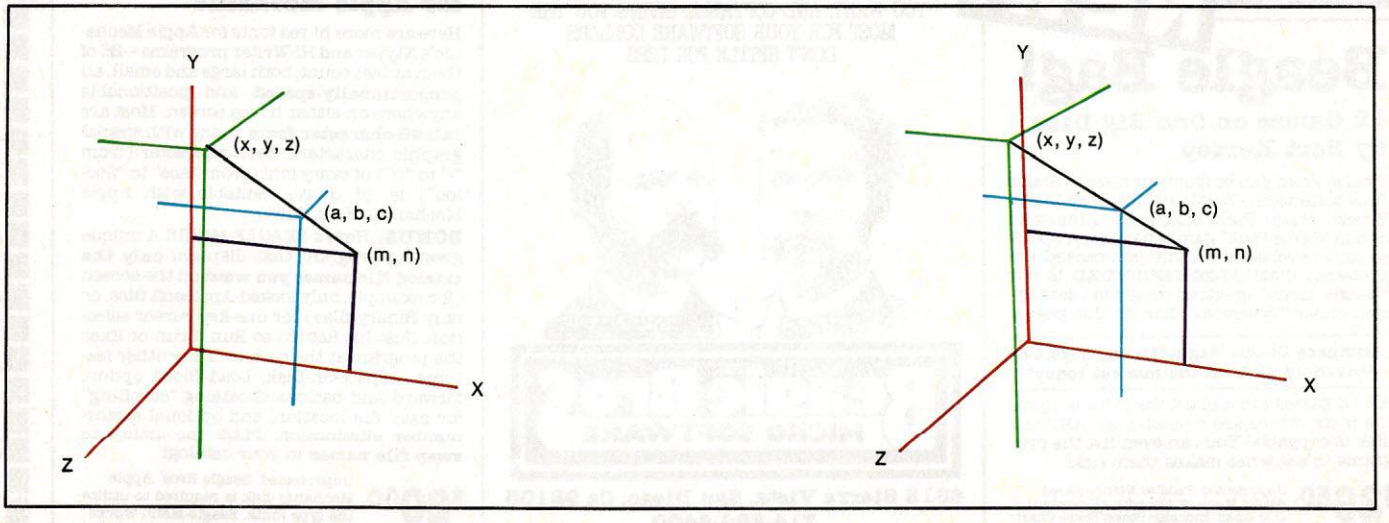
There are several other neat things you can do with this subroutine. Notice the variables Q and W in Listing 1. These can be used to displace the image on the display. For instance, if the origin of coordinates on your system is in a corner instead of the middle, you can insert appropriate values for Q and W to move the display point (0, 0) back to the center.

The TRS-80 Color Computer has the coordinate origin in the upper left corner of the display, with a range of m from 0 to 255 and n from 0 to 192 in the highest resolution mode. Setting Q=128 and W=96 causes the point (0, 0) to be plotted in the center of the screen. So you can use Q and W to position the image on the display. On

A	X coordinate of point in object to be displayed
A1	A after rotation about Z axis
AA	A1 after rotation about Y axis
B	Y coordinate of point in object to be displayed
B1	B after rotation about Z axis
BB	B1 after rotation about Z axis
C	Z coordinate of point in object to be displayed
C2	C after rotation about Y axis
CC	C2 after rotation about X axis
CF	Conversion factor for degrees to radians
CP	Cosine of rotational angle about Y axis
CS	Cosine of rotational angle about Z axis
CT	Cosine of rotational angle about X axis
FG	Toggle variable (alternates between 1 and -1)
I	Loop index
J	Loop index
K	Loop index
M	X coordinate of point on display
N	Y coordinate of point on display
PEN	Current pen (color) number
PH	Rotational angle about Y axis
PI	3.14159265
PLOT	User-supplied line number of plotting subroutine
PN	Temporary value of PEN
PS	Rotational angle about Z axis
Q	Display X coordinate of origin
R	Radius of a circle (distance between two points in Listing 7)
SP	Sine of rotational angle about Y axis
SS	Sine of rotational angle about Z axis
ST	Sine of rotational angle about X axis
TH	Rotational angle about X axis
W	Display Y coordinate of origin
X	X coordinate of viewer
XRES	Number of resolvable units on X axis of display
XX	X coordinate of polygon vertex
Y	Y coordinate of viewer
YRES	Number of resolvable units on Y axis of display
YY	Y coordinate of polygon vertex
Z	Z coordinate of viewer

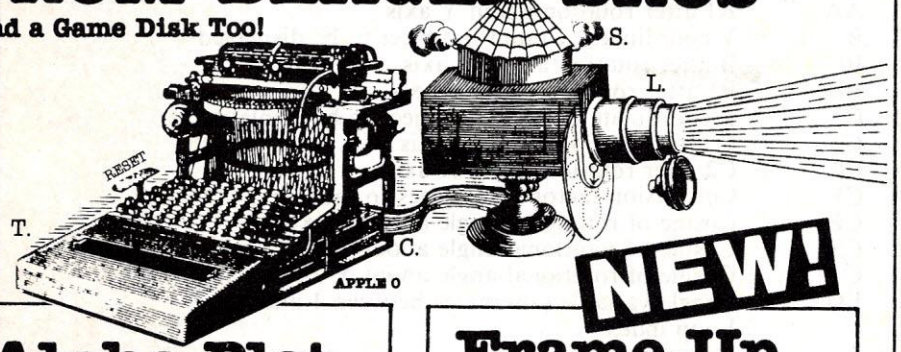
Table 1. Index of variables used in listings.

Figure 2. Stereo projection of viewer, object, and display, illustrating projection of object image from viewer to display.



NEW APPLE® UTILITIES FROM BEAGLE BROS

And a Game Disk Too!



NEW!

Alpha Plot

Hi-Res Graphics/Text Utility by Bert Kersey & Jack Cassidy

Here are a few of Alpha Plot's useful graphics features. Compare with other graphic utilities at any price—

HI-RES DRAWING: Create hi-res pictures and charts with text, on both pages; all Optional Xdraw cursor (see lines before drawing). Mix colors & Reverse (background opposite). Circles, Boxes, Ellipses; filled or outlined. **Compress Hi-Res to 1/3 disk space.** Relocate any portion of an image anywhere on either page. Superimpose too & convert hi-res to lo-res for colorful abstracts!

HI-RES TEXT: Beautiful upper/lower case with descenders (no hardware required). Color and reverse characters positionable anywhere (no vtab/htab limitations). Professional-looking **proportional spacing** and adjustable character height and letter spacing. Sideways typing for graphs too!

$39.50

- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #4
- ☐ Peeks & Pokes Chart

NEW!

Beagle Bag!

12 Games on One Big Disk by Bert Kersey

Twelve great games from our classic Beagle Bros collection—TextTrain, Slippery Digits, Wowzo, Magic Pack, Buzzword... Almost all of our "Game Pack" games have been updated and re-released on one jam-packed unprotected disk! **ALSO INCLUDED** is our "Beagle Menu" greeting program (description under "Typefaces" disk on this page).

Compare Beagle Bag with any 1-game locked-up disk on the market today!

All 12 games are a blast, the price is right, the instructions are crystal clear, AND the disk is copyable! You can even list the programs to see what makes them tick!

$29.50 Unprotected. Paddles NOT required. Beagle Menu works with all normal-DOS disks. Includes Peeks/Pokes Chart.

Frame-Up

Graphics Display Utility by Tom Weishaar

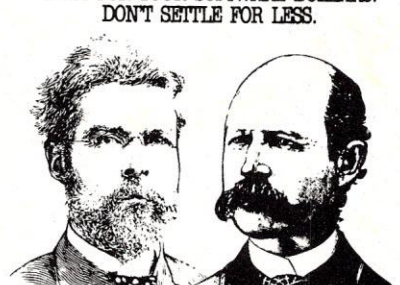
Frame-Up is a very-high-speed Apple "slide projector" utility that lets you create professional-looking displays of intermixed hi-res, lo-res and text pages **on any Apple.** Frame-Up is very easy-to-use and above-all **FAST,** allowing you to load hi-res pictures, for example, in **2½-seconds;** that's five-times faster than normal! Paddles or keyboard are used to change images in forward or reverse order, skipping pages if you want. OR presentations may be left unattended, with **each page individually timed** to appear and remain on the screen from 3 to 99 seconds, as you choose.

Frame-Up includes a sophisticated black and white **text screen editor** that lets you create text "slides" as part of your show. You can even add type "live" on the screen during your presentations. Up to 17 hi-res or 136 lo-res/text pages may be stored per disk. One or two drives are supported. The order and timing of your graphics and text images may be easily (and instantly!) arranged and rearranged. Frame-Up includes a **display module which may be copied** and distributed to your associates so they can run your display, as you designed it, on their Apple or ANY Apple!

Frame-Up is ideal for store displays, presentations to the boss, club programs, trade show booths, product demos, promotions, seminars, conventions, classes, and so on.

$29.50 Machine language. Unprotected. 48K minimum. Peek/Poke Chart included.

BEAGLE BROS DISKS ARE UNLOCKED AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



Beagle Bros™ MICRO SOFTWARE

4315 Sierra Vista, San Diego, Ca 92103
714-296-6400

"APPLE" is a registered trade mark of You-Know-Who.

Apple® Mechanic

Shape Writer/Byte-Zap Utility by Bert Kersey

Another best-selling multiple-utility disk—Nine useful, listable, copyable and customizable programs—

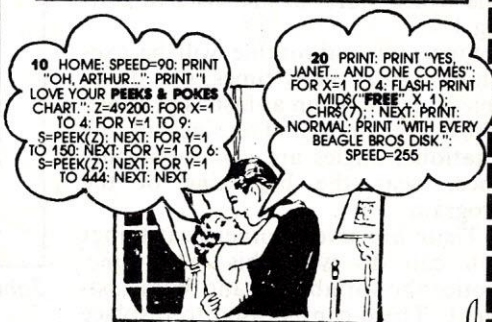
SHAPE EDITOR: Put professional hi-res animation in your programs. Keyboard-draw any shape and let your Apple write a shape table and store it on disk. Design large and small **custom typefaces** too, with special characters. 6 fonts on the disk. LISTable demos show how to use shape tables to animate games, graphic displays, and attractive Charts & Graphs. A valuable time-saving utility/learning tool.

BYTE ZAP: A MUST utility. Rewrite any byte on a disk by loading a sector onto the screen for inspection. **Hex/Dec/Ascii** display optional. Examine bytes via cursor control; enter hex, dec or ascii to change. Create illegal filenames, restore deleted files, change greeting program names, repair/protect disks, change DOS, examine program files. Clear illustrated instructions show how disk data is stored and how to access it. Very educational.

MORE: A disk PACKED with useful music, text and hi-res tricks **for use in your programs.** A great demo-writer program, useful hi-res utilities and educational, entertaining documentation.

$29.50

- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Tip Book #5
- ☐ Peeks & Pokes Chart



NEW!

Typefaces

for Apple Mechanic

Here are more hi-res fonts for Apple Mechanic's Xtyper and Hi-Writer programs—26 of them at last count, both large and small, all **proportionally-spaced** and positionable anywhere on either hi-res screen. Most are **full 96-character fonts** many with special graphic characters. Each character (from "!" to "□") of every font (from "Ace" to "Zooloo") is, of course, editable with Apple Mechanic's Font Editor.

BONUS: Here's BEAGLE-MENU! A unique greeting program that displays **only the catalog file names you want** on the screen (for example, only locked-Applesoft files, or only Binary files) for one-key cursor selection. Just hit Return to Run, Brun or Exec the program at the cursor. Many other features— Space-on-Disk, Load/Bload option, forward and backward catalog "scrolling" for easy file location, and optional sector-number elimination. PLUS the ability to **swap file names** in your catalog!

$20.00 Unprotected. Beagle Bros' Apple Mechanic disk is required to utilize the type fonts. Beagle-Menu works with all normal-DOS 3.3 disks.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros, 714-296-6400, **OR** his favorite software distributor.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros, 714-296-6400, **OR** his favorite software distributor.

NEW!

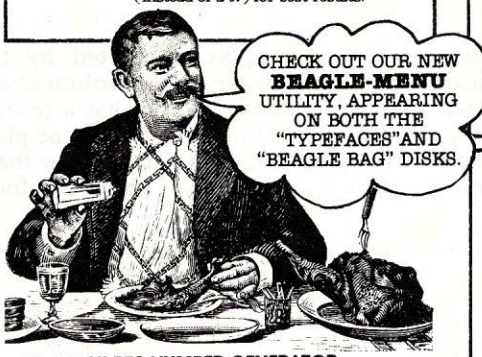
Flex Text

70-Column Text Utility
by Mark Simonsen

Flex Text is a unique utility that lets you print variable-width text on Apple's hi-res screens in normal 40-column format, 20-column expanded or 56- and **70-column condensed** characters. Character widths may be mixed as you like for emphasis. Flex Text understands **normal Applesoft** Basic commands, including Home, Inverse, Normal, Vtab 1-24 and **Htab 1 through 70**! It also supports text window pokes and scrolling, so you can program normally, but with the **ability to add text to graphics**, or graphics to text! You can even run your existing programs using these features!

Flex Text is easy to use; just boot it and go! You can now display **upper and lower case** characters in any width without hardware. Every keyboard character may be redefined as any symbol you like with a custom text **character editor.** You may toggle between the "normal" text screen and both hi-res pages if you like. Flex Text is **completely compatible** with Neil Konzen's Program Line Editor and G.P.L.E.

$29.50 Machine language. Unprotected. 48K min. Peek/Poke chart included. Condensed character display requires a monitor (instead of a tv) for best results.




```
10 REM HI-RES NUMBER GENERATOR
20 SIZE=5: SCALE=SIZE: REM NUMBER-HEIGHT
30 HGR: HOME: POKE 232, 0: POKE 233, 3: ROT=0
40 FOR A=768 TO 830: READ B: POKE A, B: NEXT A
50 N=N+1: N$=STR$(N): X=99: Y=0
60 FOR A=1 TO LEN(N$): HCOLOR=0: DRAW 8 AT
   X, Y: HCOLOR=3: DRAW VAL(MID$(N$, A, 1))
   AT X, Y: X=X+SIZE+SIZE: NEXT A: GOTO 50
70 DATA 20, 0, 24, 0, 27, 0, 31, 0, 35, 0, 39, 0, 44, 0,
   49, 0, 52, 0, 57, 0, 53, 62, 36, 0, 49, 38, 0, 53,
   55, 61, 0, 53, 23, 37, 0
80 DATA 46, 38, 52, 0, 61, 46, 62, 5, 0, 61, 54, 37, 7,
   0, 53, 38, 0, 54, 37, 60, 46, 0, 53, 39, 53, 62, 5, 0
```

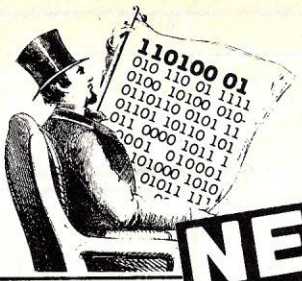
DOS Boss

Disk Command Editor
by Bert Kersey & Jack Cassidy

A classic Apple utility you will ENJOY! Rename DOS commands ("Catalog" can be "Cat", etc.). PROTECT PROGRAMS; any unauthorized save- attempt produces a "Not Copyable" message. Also **List-prevention** and 1-key program-run from catalog. Custom catalogs: Change Disk Volume message to your title; Omit or alter file codes. Rewrite error messages: "Syntax Error" can be renamed "Oops!!" or anything you want! **Two books included**— Fascinating documentation and hours of good Apple reading!

Dos Boss's change features may be appended to your programs so that anyone using your disks (booted or not) formats DOS as YOU designed it.

$24.00
- ☐ Unprotected disk (32K/48K)
- ☐ The Dos Boss Book
- ☐ Beagle Bros Apple Tip Book #2
- ☐ Peeks & Pokes Chart



NEW!

Before you buy any Apple game disk, compare features:

Is there more than one game? Beagle Bag features TWELVE unique games on one disk PLUS a bonus greeting-program utility for use on all of your existing 3.3 disks.

Can it teach programming skills? Beagle Bag games are listable so you can see what makes them work. You can even CHANGE each game's features if you want.

Is the disk copyable? Beagle Bag can be backed-up with ANY copy program. Don't buy software that can't be backed up!

Is the disk unlocked? The Beagle Bag disk can be catalogged, loaded-from, saved-to and Fidded, making it more flexible and more FUN than any locked-up One-Game disk on the market today.

Is the disk priced right? Counting the bonuses, Beagle Bag costs less than $2 per program. This is a disk that will "earn its keep" as long as you own your Apple!

BEAGLE BAG $29.50

(See description on previous page.)

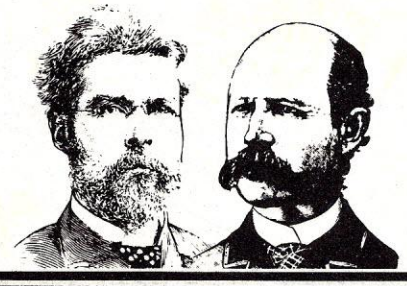
Tip Disk#1

100 Tip Book Tips on Disk
by Bert Kersey

100 programs from Beagle Bros' Tip Books 1, 2, 3 and 4— Fascinating tricks to make your Apple do things it's never done before! All 100 programs are listable, copyable and changeable; and each teaches another fascinating Apple programming technique. **Two different charts are included.**

$20.00
- ☐ Unprotected (32K/48K)
- ☐ Peeks & Pokes Chart
- ☐ Apple II Command Chart

BEAGLE BROS DISKS ARE UNLOCKED AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



Beagle Bros™ MICRO SOFTWARE

4315 Sierra Vista, San Diego, Ca 92103
714-296-6400

"APPLE" is a registered trade mark of You-Know-Who.

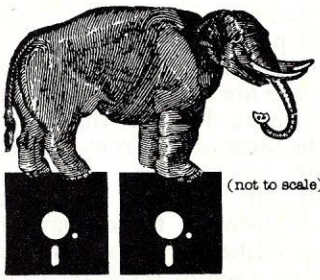
Utility City

21 Utilities on One Disk
by Bert Kersey

A best-seller since it hit the market, and a MUST for your program-development library. Take a look at the features—
List Formatter makes properly-spaced & indented listings with page breaks; each statement on new line, if-thens and loops called out; a great de-bugger! **Multi-Column Catalog** in any page-width to any printer or CRT. Auto-post Run-Number and last-used Date in programs. Put INVISIBLE working commands in your listings. Access program lines in memory for repair & illegal alteration. Alphabetize & store info on disk. Run any program while another stays intact. Renumber to 65535. Save inverse, trick and **invisible file names**. Convert dec to hex & binary, or Integer to FP. Append programs. Dump text screen to printer...

21 LISTABLE UTILITIES TOTAL!

$29.50
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #3
- ☐ Peeks & Pokes Chart



(not to scale)

GOTO Your Apple Dealer.

Most dealers carry our software. If yours doesn't, he can have our disks in his store for you **within 2-3 days** by calling us or his favorite software distributor.

Or Order by Phone:

24-Hour **Toll-Free** Order Desk:
Visa/MasterCard/COD* orders, call
Nationwide: **1-800-854-2003** ext.827
California: **1-800-522-1500** ext.827
Alaska/Hawaii: **1-800-854-2622** ext.827
(ORDERS ONLY, PLEASE) *COD, add $3.00.

OR ORDER BY MAIL—

RUSH! The disk packages checked below plus the free 11x17 Peeks & Pokes Chart:

☐ Alpha Plot .	$39.50	☐ Frame-Up .	$29.50
☐ A.Mechanic	$29.50	☐ Tip Disk#1	$20.00
☐ Beagle Bag .	$29.50	☐ Typefaces . .	$20.00
☐ DOS Boss . .	$24.00	☐ Utility City .	$29.50
☐ Flex Text . .	$29.50		

(Add $1.50 Shipping, any size order. California, add 6% tax.)

NAME$= _____

ADDR$= _____

CITY$= _____

ZIP$= _____

VISA — VISA/MASTERCARD Include Card Number & Expiration Date. — master charge

Mail U.S.check, money order or Visa/MasterCard numbers to:

BEAGLE BROS, DEPT-C
4315 SIERRA VISTA
SAN DIEGO, CA 92103

All Orders Shipped Immediately.

Please add $4.00 for shipping outside North America. COD orders add $3.00. California residents, add 6%.

CIRCLE 118 ON READER SERVICE CARD

some systems, the Y coordinate on the display is positive downward instead of upward. To keep things from coming out upside down, you can change line 1080 to:

1080 N=-(BB+(BB-Y))*CZ+W.

Another operation, similar to moving the projection of the object around the display, but not quite the same, is translation of the object itself before the projections (m, n) are computed. This corresponds to actually moving the object to a new position. To do this you must add the statement:

1055 RETURN

to Listing 1. Then a GOSUB 1000 will calculate the rotated coordinates of the object only. You can then add or subtract displacement coordinates to the rotated coordinates (aa, bb, cc) and

GOSUB 1060

Now that you know how to plot images of points (a, b, c) in perspective, as seen from a view position (x, y, z), you are ready to make stereo pairs of images. The only thing left is to plot the same object from two view points, one for each eye.

Usually, if you are positioned directly in front of the display, the (x, y, z) coordinates of each of your eyes will be given by (es/2, 0, zd) for the right eye and (-es/2, 0, zd) for the left. The variable es is the distance between your eyes, and zd is your distance from the display. The numerical values for these variables will depend on the plotting units you use. We define one plotting unit as the distance between two adjacent points (pixels) on your display, separated by the minimum distance of resolution. As an example, my plotter has a resolution of 0.005 inch, so this is one plotting unit. Since I normally view these plots at a distance of about one foot,

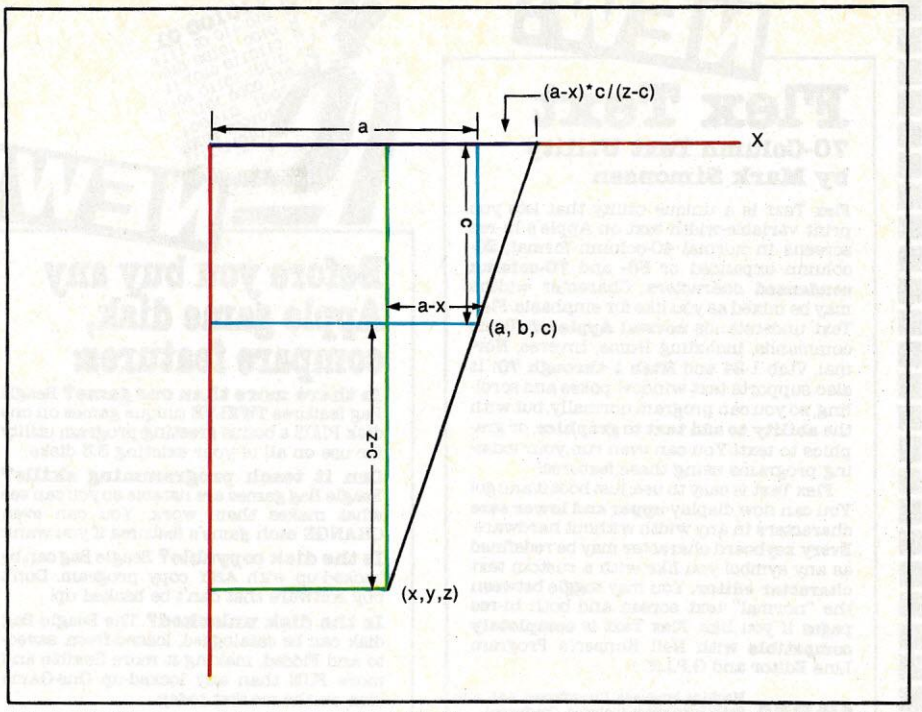
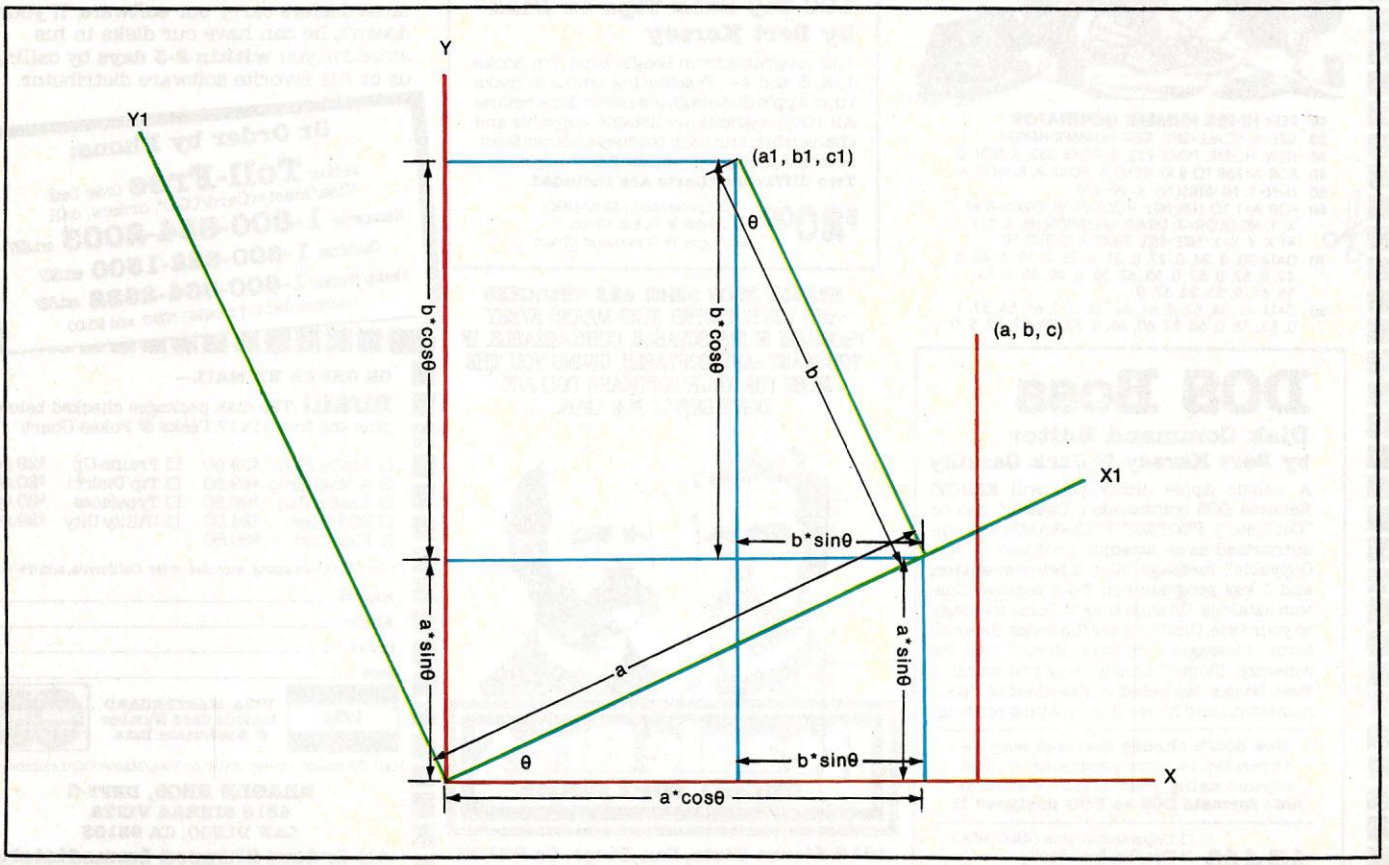


Figure 3. Top view of viewer-object-display relationship. Notice that the legs of the two triangles have the same ratio.

Figure 4. Rotation of object by angle θ about Z axis.



January 1983 © Creative Computing

CALL "THE COMPUTER-LINE"

When you call us, you talk to fully qualified computer specialists trained to answer all your questions pertaining to our line of microcomputers. We are renowned for our excellent after sales support and our promptness for delivery. Peace of mind and excellence in service is our pledge to all our customers.

IBM PERSONAL COMPUTER PRODUCTS

QUADRAM CORPORATION

QUADBOARD

The ultimate memory board for the IBM, featuring
- fully expandable from 64 to 256K
- parallel port
- asynchronous (RS232) serial port
- clock/calendar

$CALL

MICROFAZER
- buffering from 8 to 64K (4 to 32 pages of text)
- printer and computer independent
- parallel/parallel; serial/serial and parallel/serial available
- compute while you print!

INTERFAZER

Used as:
- Peripheral buffer
- Multi-User Printer Controller
- Computer I/O Expander
- Incompatible Device Interface
- Peripheral Multiplexer
- Data Transfer Rate Converter

$CALL

Davong Systems, Inc.

Description:
The Davong Systems Memory Card is a convenient RAM memory expansion card for use in the IBM Personal Computer.

The Memory Card may be placed in any free system slot. It is completely compatible with all IBM Personal Computer software and hardware, and runs at the same speed as IBM memory products.

64K RAM $225 192K RAM $499
256K RAM $599

Hard Disk System for the IBM® Personal Computer.

ONLY $1595.00

Description: 5 MEGABYTES STORAGE

The Davong System's Hard Disk Drive fits conveniently inside the second floppy drive location of the IBM Personal Computer chassis, providing more than 30 times the capacity of a floppy diskette, plus greater speed and reliability.

The DSI-501 System is compatible with IBM software, and supports IBM DOS* The system includes all necessary components and software for installation.

12 MEGABYTES STORAGE $2195.00

TANDON ADD-ON DRIVES FOR IBM

SPECIAL

TMS-100-2. Double sided drive, 320 K bytes storage $274
Including shipping anywhere within the continental U.S.A.

IBM SOFTWARE

BUSINESS		ENTERTAINMENT	
TAX MANAGER	$199	GALACTIC ATTACK	$26
256K VISICALC	$189	ZORK I	$29
VISITREND/VISIPLOT	$239	ZORK II	$29
VISIDEX	$189	DEADLINE	$39
EASY EFFECTIVE ACCOUNTING SYSTEM	$389	**CALL FOR NEW GAMES AT UNBEATABLE PRICES**	
SUPERCALC	$219	T and G JOYSTICKS	$44.95
SUPERWRITER	$289	ADAM AND EVE PADDLES	$29.95

CALL FOR SOFTWARE NOT LISTED

MAYNARD ELECTRONICS

Floppy Disk Controller with parallel port	$229
Floppy Disk Controller with serial port	$259

MEMORY BOARDS

64K, 128K, 192K, 256K $CALL

PERIPHERALS FOR ALL COMPUTERS

PRINTERS

NEC	
Spinwriter 7710/7730	$2339
8023A	$ 489
EPSON (Graftrax Plus)	
MX-80	$ 429
MX-80FT	$ 449
MX-100	$ 549
OKIDATA	
80 no tractor	$ 339
80 with tractor	$ 399
82A no tractor	$ 439
82A with tractor	$ 479
83A	$ 689
84A parallel	$1029
84A serial	$1139
2K Buffer	$ 55
Graphics 82A, 83A	$ 79

All Epson, NEC, C-ITOH and OKIDATA dot matrix printer prices quoted are for **immediate** delivery inclusive of shipping, insurance and handling charges

MONITORS

Zenith ZVM-121 Phosphor, 15 MHZ	$ 119
NEC 1201 Phosphor, 20 MHZ	$ 179
NEC 1201 Composite, Color	$ 335
NEC 1201 RGB Color	$ 899
Amdek 300 Phosphor	$ 179
Amdek Composite Color	$ 349
Amdek IBM Compatible Color	$ 749
BMC Green	$ 89
BMC Composite Color	$ 279

INTEGRAL DATA SYSTEMS

PRISM 132 Color printer with all options
- 200 cps Sprint Mode
- 4-color printing
- Friction/Tractor feed $1595

C-ITOH F10 Word Quality Printer
- 40 CPS Printing
- Letter quality excellence

Now Only $1395

Prowriter 120cps (Parallel)	$ 469
Prowriter 120cps (Parallel Serial)	$ 619
Prowriter (136 column) Parallel	$ 699
Prowriter (136 column) Parallel Serial	$ 749

SMITH CORONA TPI

Daisywheel Letter Quality NOW ONLY $589

Brother HR1 Letterquality $ 899

MODEMS

Hayes Smartmodem 300 baud	$ 229
Hayes Smartmodem 1200 baud	$ 549
Novation Cat	$ 145
Novation D-Cat	$ 165
Novation Auto Cat	$ 209
CERMETEK 1200 baud modem	$CALL

DISKETTES

SCOTCH WITH PLASTIC LIBRARY CASES (Boxes of 10) (48 Track single-sided double density	$25.95
VERBATIM DATALIFE SS DD (Boxes of 10)	$24.95
ELEPHANT MEMORY DISKETTES (Box of 10)	$24.95

APPLE PRODUCTS

CALIFORNIA COMPUTER SYSTEMS	
7710 Async. Serial Int.	$135
7490 GPIB (IEEE-488)Int.	$239
7470 Ana. to Dig. Converter	$ 99
7711 Async. Serial (Term)	$135
7712 Sync. Serial Int.	$149
7721 Apple Parallel Int	$109
Calendar/Clock Module	$ 99
Programable Timer	$ 99

MOUNTAIN HARDWARE	
CPS Multi-Function Card	$169
The Clock	$229
Supertalker	$159
Music System	$319
Expansion Chassis	$599
Romwriter	$139
Ram Plus	$149

MICROCOMPUTER BUSINESS INDUSTRIES

Appletime™ Clock Card	$ 89
VIP™ Card (The Ultimate graphics interface - cable)	$129

BUSINESS SOFTWARE

VISICORP, INC.	
Desktop Plan III	$229
Desktop Plan II	$189
Visifiles	$189
Visiplot	$159
Visitrend/Visiplot	$229
Visidex	$189
Visiterm	$ 79
Visicalc 3-3	$189
Visipak	$539

STONEWARE	
DB Master	$169
DB Utility Pack	$ 69

APPLE WORD PROCESSING

On line's Sensational **Screenwriter II** ..... $ 89

Word Handler $159

WE SERVICE AND SUPPORT THE NEW BASIS 108 MICROCOMPUTER

Call for Continental, Dakin 5, Broderbund, Automated Simulations, Avant-Garde, Edu-Ware, Denver, Howard, Sirius, Sensible, Synergistic Software Etc

Apple Compatible ADD-ON DISK DRIVES FROM ONLY $299

Hard Disks + 8" Disks for Apple, TRS-80 $CALL

80 COLUMN CARDS FOR APPLE

Wesper 80 Card	$259
Vision 80 Card (Vista)	$279
Videx 80 Card	$249

RAM CARDS

Davong 16K Card	$ 89
Microsoft 16K Card	$129
T and G PRODUCTS	
Game paddles	$ 29
Joy Stick	$ 44
Selecta-port Expander	$ 49

MODEMS FOR APPLE

Hayes Micromodem II	$279
Novation Apple Cat II	$299

MODEM SOFTWARE

Visiterm	$ 79
Transend II	$119

CPM FOR APPLE

Microsoft Z80 Softcard $269

MISCELLANEOUS APPLE PRODUCTS

Enhancer II	$119
Sup R Mod	$27.95
System Saver	$ 79

CALL FOR PRICES ON B & H, APPLE II, FRANKLIN ACE, BASIS 108

ATARI

ATARI 800 Computer	$675
810 Disk Drives	$459
850 Interface Module	$189
830 Acoustic Modem	$169
16K Memory Module	$ 89
32K Memory Module	$ 99
Paddle Controller (Pair)	$ 19
Joystick Controller (Pair)	$ 19

ATARI SOFTWARE

Conversational French/German/Italian/Spanish, each module	$ 49
Touch Typing	$19.95
Asteroids	$35.95
Centipede	$35.95
Missile Command	$35.95
Pac-Man	$35.95
Space Invaders	$35.95
Star Raiders	$39.95

NEC PERSONAL COMPUTER

PC-8001A	Keyboard and processor unit, including 32K Ram, 24KB N-Basic Rom, cassette tape recorder interface, parallel printer interface, display interface	$749
PC-8012A	Modular expansion unit, including I/O bus extension, diskette adaptor, 32KB Ram, real-time clock, 8 priority interrupt levels, 6 slots for additional boards	$479
PC-8023A	Dot matrix printer—100 cps, bidirectional printing, proportional printer	$499
PC-8031A	Dual diskette unit, including two 163K byte diskette drives, interface cable, enclosure and operating system	$749

NEC APC COMPUTER $3295

WRITE FOR OUR IBM/APPLE/NEC/ATARI CATALOG

IN COLORADO (303) 279-2727 — (303) 279-2848

SHOWROOM
1019 8TH STREET
GOLDEN, CO 80401

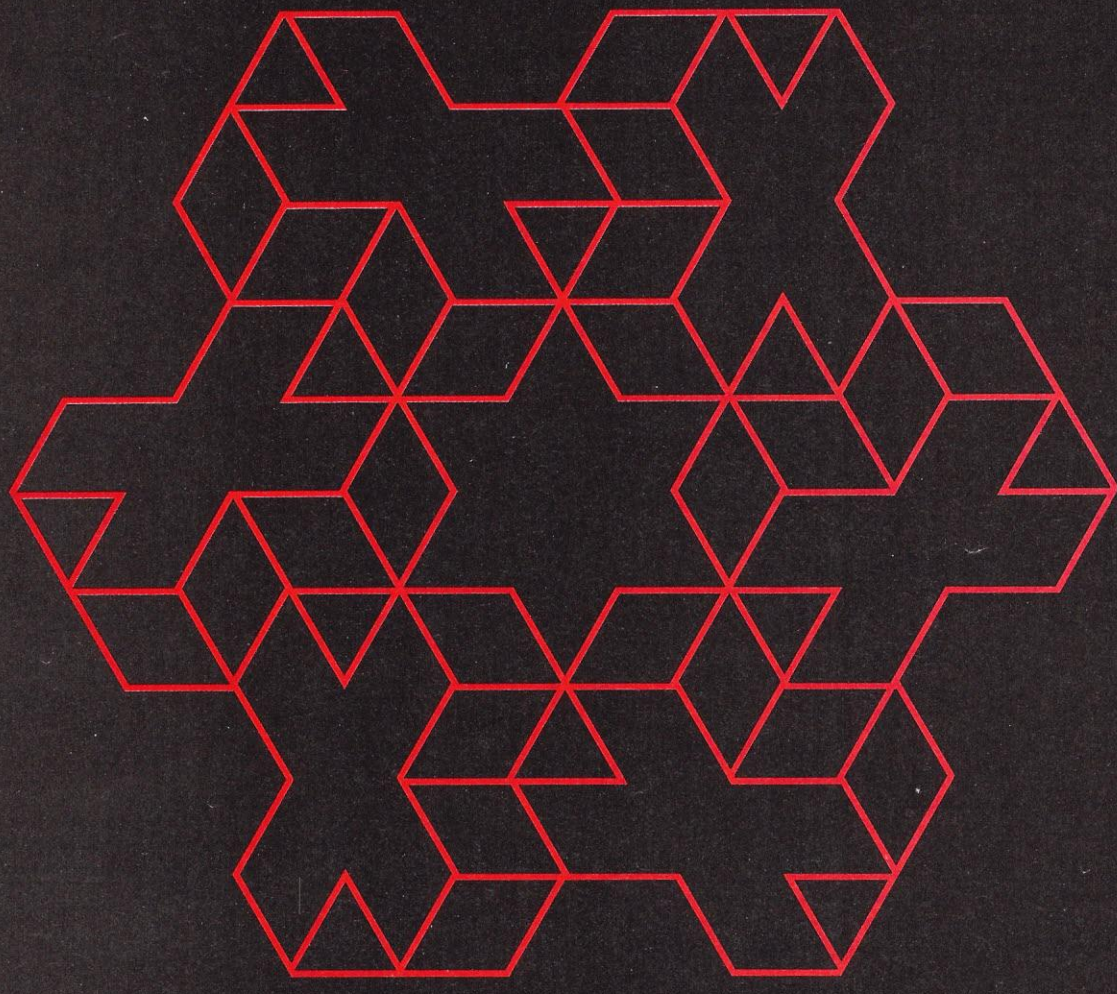
CALL "THE COMPUTER-LINE"

1-(800)-525-7877

TERMS RETAIL MAIL ORDER ADD 1% SHIPPING (MINIMUM $2.50) UPS GROUND WE HONOR ALL MANUFACTURERS WARRANTIES AND EXCHANGE FAULTY GOODS IMMEDIATELY SPECIALISTS IN APO AND INTERNATIONAL DELIVERIES ALL PRICES REFLECT A 2% CASH DISCOUNT PURCHASE ORDERS FROM ORGANIZATIONS WITH GOOD CREDIT ACCEPTED 10% RESTOCKING FEE ON RETURNED NON-FAULTY GOODS PRICES SUBJECT TO CHANGE WITHOUT NOTICE

CIRCLE 145 ON READER SERVICE CARD

Accounting Plus II™



Plus...

Software Dimensions announces three new modules for Apple II* users with Accounting Plus II — each designed with the same high standards and human engineering factors that have made Accounting Plus II so popular.

With **Invoices Plus** you can inventory items just by entering part numbers; easily invoice non-standard items and miscellaneous charges; place user-defined comment lines on the invoice; get twice as many line items per invoice; automatically generate multiple pages; specify individual invoice numbers or assign them automatically — and more.

G L Plus expands your financial reporting capabilities, including changes in your financial position, offering even more flexibility for your General Ledger module. Typical reporting features include Budget/Prior Months' Listing, Income Statements, Balance Sheets, Budget Variance Report, Comparative Reports, Source and Use of Funds.

Labels Plus offers a versatile label package that lets you maintain one or more mailing lists with up to 1,000 names each, as well as to access existing Vendor and Customer files easily; add, edit, and delete names; sort and select; print mailing labels.

You won't find this kind of flexibility and sophistication in any other Apple II accounting system. To find out more, contact your Accounting Plus II dealer.

Software Dimensions Inc., 6341 Auburn Blvd., Citrus Heights, CA 95610. 916/722/8000

*Registered trademark of Apple Computer Inc. Accounting Plus is a trademark of Software Dimensions Inc.

© 1982 Software Dimensions Inc

CIRCLE 261 ON READER SERVICE CARD

Listing 1. Rotation-perspective subroutine begins at line 1000.

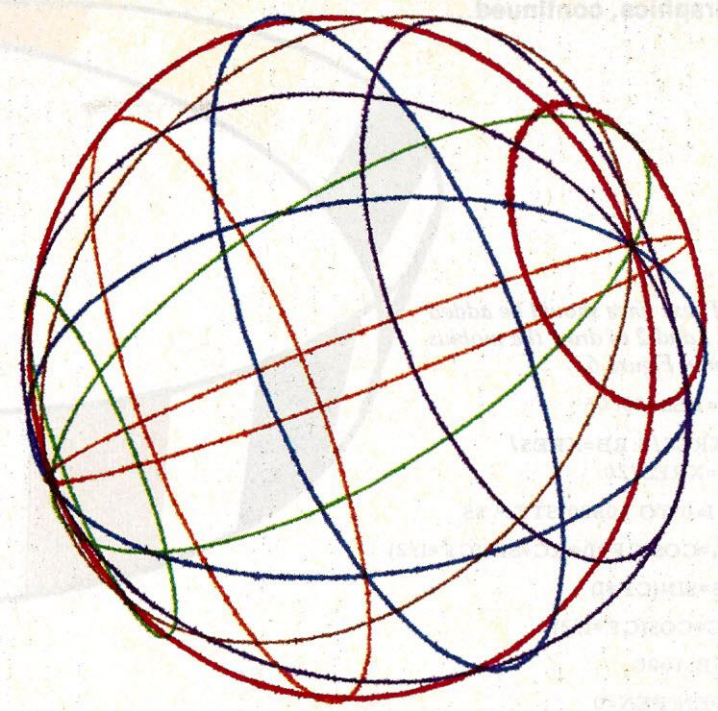
```
10   CF=3.14159/180
20   INPUT "PSI, PHI, THETA";PS, PH, TH
30   CS=COS(CF*PS):SS=SIN(CF*PS)
40   CP=COS(CF*PH):SP=SIN(CF*PH)
50   CT=COS(CF*TH):ST=SIN(CF*TH)
100  (Main body of program starts here.)
     .....
1000 A1=A*CS-B*SS
1010 B1=A*SS+B*CS
1020 AA=A1*CP-C*SP
1030 C2=A1*SP+C*CP
1040 BB=B1*CT-C2*ST
1050 CC=B1*ST+C2*CT
1060 CZ=CC/(Z-CC)
1070 M=AA+(AA-X)*CZ+Q
1080 N=BB+(BB-Y)*CZ+W
1090 RETURN
```

Listing 2. Additional lines which should be added to Listing 1 to produce stereo pairs of images. Any variable which depends on XRES or YRES may need slight changes for different systems. In determining Q and W it is assumed that the display origin is in the lower left corner.

```
5    INPUT "NUMBER OF PLOTTING
     UNITS IN X AND  Y";XRES, YRES
15   X=-XRES/20:Y=0:Z=1.5*XRES
25   Q=XRES/4:W=YRES/2
900  IF Q=XRES/4 THEN 910 ELSE END
910  Q=Q+XRES/2
920  X=-X
930  GOTO 100
```

Listing 3. Add these lines to Listing 1 and 2 to draw the sphere of Figure 5.

```
90   PI=3.14159265
100  PEN=1
110  R=XRES/6
120  FOR I=0  TO 3.13 STEP PI/6
130  FOR J=0 TO 2.01*PI STEP PI/48
140  A=R*COS(I)*SIN(J)
150  B=R*COS(J)
160  C=R*SIN(I)*SIN(J)
170  PEN=1+INT(I*6/PI)
180  GOSUB 1000
190  IF J=0 THEN PEN=0
200  GOSUB PLOT
210  NEXT J
220  NEXT I
230  FOR I=PI/6 TO 5*PI/6 STEP PI/6
240  PEN=INT(I*6/PI)+1
250  FOR J=0 TO 2.01*PI STEP PI/48
260  A=R*SIN(I)*COS(J)
270  B=R*COS(I)
280  C=R*SIN(I)*SIN(J)
290  GOSUB 1000
300  IF J=0 THEN PEN=0
310  GOSUB PLOT
320  NEXT J
330  NEXT I
```



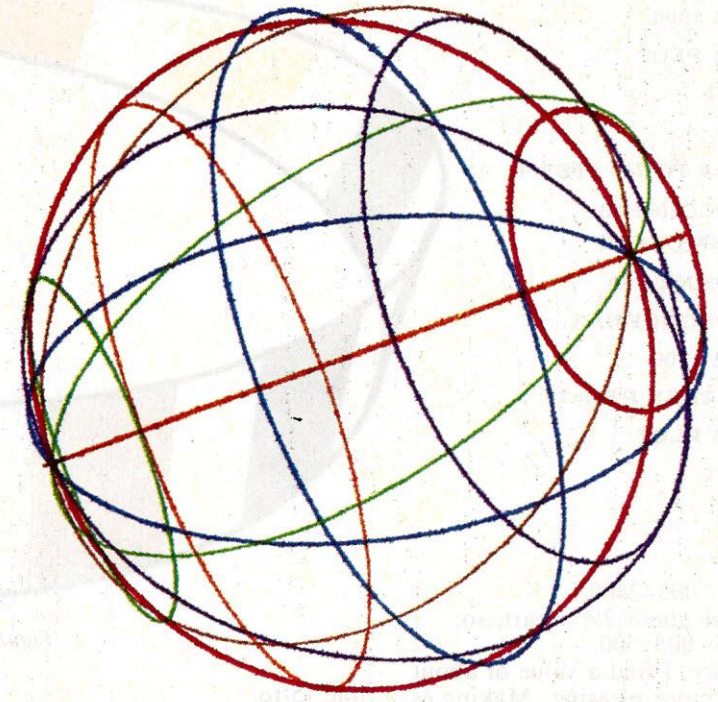
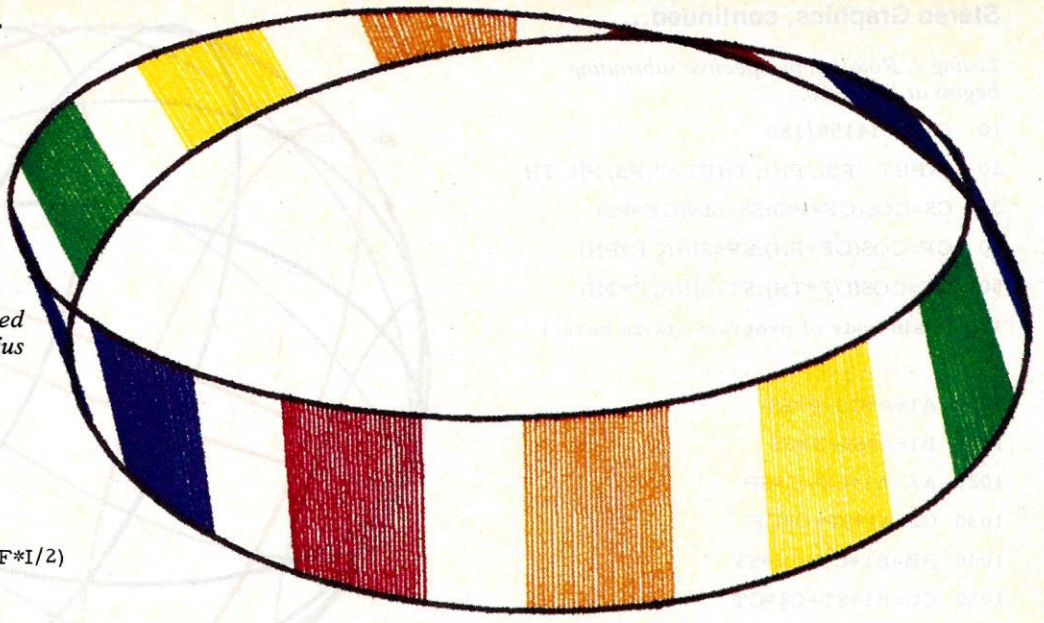


Figure 5. Sphere.



Listing 4. These lines should be added to Listings 1 and 2 to draw the mobius strip shown in Figure 6.

```
90  PEN=1:SS=30.05
95  RA=XRES/8:RB=XRES/
    4:RC=XRES/20
100 FOR I=0 TO 10800 STEP SS
110 A=RA*COS(CF*I)+RC*SIN(CF*I/2)
120 B=RB*SIN(CF*I)
130 C=RC*COS(CF*I/2)
140 GOSUB 1000
150 PN=PEN:PEN=0
160 GOSUB PLOT:PEN=PN
170 A=RA*COS(CF*I)-RC*SIN(CF*I/2)
180 C=-RC*COS(CF*I/2)
190 PEN=PEN+1
200 IF PEN=7 THEN PEN=1
210 GOSUB 1000
220 GOSUB PLOT
230 NEXT I
240 PEN=0
250 FOR I=0 TO 720 STEP 4
260 A=RA*COS(CF*I)
    +RC*SIN(CF*I/2)
270 B=RB*SIN(CF*I)
280 C=RC*COS(CF*I/2)
290 GOSUB 1000
300 IF I=1 THEN PEN=7
310 GOSUB PLOT
320 NEXT I
330 PEN=1
```

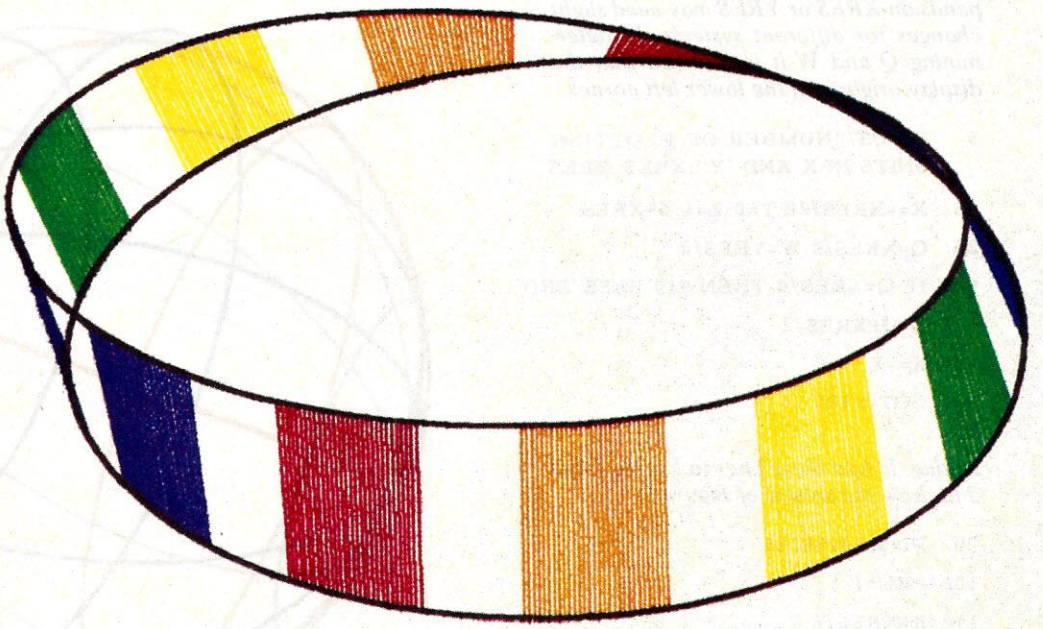


Figure 6. Mobius strip.

I use:

zd=12/.005=2400.

My eyes are about 2½" apart, so:

es=2.5/.005=500.

In practice, I find a value of about 200 to be more pleasing. Making es larger enhances the stereo effect, but if it gets too big, the illusion no longer looks real. Making zd smaller corresponds to getting closer to the display.

The lines in Listing 2 can be added to those of Listing 1 to make stereo pairs of images, the image for the left eye occupying the left half of the display. To reverse the images, change line 15 to:

```
15 X=XRES/20: Y=0:
     Z=1.5*XRES
```

The variables XRES and YRES are the number of plotting units in the X and Y directions, respectively. These will vary from system to system. I have used units appropriate to my system. Some of the other variables are defined in terms of these two and you may have to experiment to get them just right for your system. In many systems, the X plotting unit is of a different size than the Y plotting unit. To make them the same, you will have to scale (multiply) one of them by the ratio of the two. Doing this will make circles come out round rather than like ellipses.

Listings 1 and 2 combined enable us

OUR PRICES, SELECTION AND SAME-DAY SHIPPING MAKE US COMPETITIVE. OUR PEOPLE MAKE US EXPERTS.

Red Baron. Home of the Nation's Largest Computer Printer Inventory.

NEC 8023
Outstanding Graphics, Print Quality & Performance

144 x 160 dots/inch • Proportional Spacing • Lower case descenders • N x 9 dot matrix • 8 character sizes • 5 unique alphabets • Greek character set • Graphic symbols • 100 CPS print speed • Bi-directional logic-seeking • Adjustable tractors • Single-sheet friction feed • Vertical & horizontal tabbing

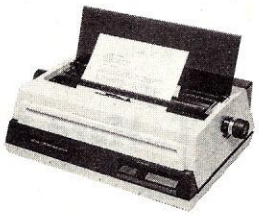
NEC 8023
Dot Matrix . . . . . List $795 **$Call**

IDS Prism 80/132
Affordable Color, Speed

Dot Resolution Graphics • 9-wire staggered printhead • Lowercase decenders • 200 CPS • Bi-directional, logic-seeking • 8 character sizes • 80-132 columns • Proportional spacing • Text justification • Optional Color

Prism 80 . . . . . Base List $1,299
Prism 132 . . . . . Base List $1,499 **$Call**

Smith-Corona TP-1
Daisy Wheel Printer For Under $900



Letter quality • Standard serial or parallel data interface • Drop-in ribbon • 144 WPM • Various fonts available • Loads paper like typewriter • Handles single sheets for forms

Smith-Corona TP-1 . . . . . List $895 **$Call**

Televideo CRT's
Price, Performance & Reliability

910 . . . . . List $699
925 . . . . . List $995
950 . . . . . List $1195

$Call For low Prices

Other Quality Printers at Red Baron

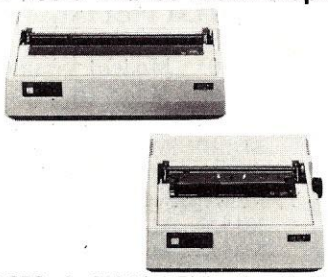
	List	Discount
Anadex DP-9501A	$1725	$Call
Anadex DP-9620A	$1845	$Call
Anadex WP-6000	$3250	$Call
C. Itoh 8510 Prowriter	$845	$Call
IDS Microprism 480	$799	$Call
Diablo 630/6	$2995	$2570
NEC Spinwriter RO Serial Parallel 7700	$3055	$2500
Serial 3510	$2290	$1700

The Epson Series
High-Quality Printers at a Low Price.

Epson MX80FT . . . . . List $745
Epson MX-100 . . . . . List $995 **$Call**

Full Line of Epson Acessories.

The Okidata Series
Hi-Res & TRS 80 Block Graphics



120 CPS • 9 x 9 Matrix • Bidirectional logic seeking printing • Lower case descenders • Four print styles • Optional Hi-Res Graphics

Okidata 82A . . . . . List $649
Okidata 83A (w/Tractor) . List $995
Okidata 84 (Parallel) . . List $1395 **$Call**

Interface Equipment
Complete Stock of Options, Cables and Accessories.

GRAPPLER + APPLE INTERFACE $175
BUFFERBOARD $185
CCS APPLE SERIAL Interface & Cable . . . $150
ORANGE INTERFACE for Apple II Parallel Interface Board and Cable . . . . . $ 90
NOVATION D-CAT modem $155
Novation Cat Acoustic Coupler $150
COMPLETE STOCK OF EPSON ACCESSORIES . . . . . $Call
CUSTOM PRINTER CABLES FOR Apple, Atari, IBM, TRS-80 (all models) . . . . . $Call
HAYES MICROMODEM II $300
PRINTER STANDS: Large . . . . . $ 99
Small . . . . . $ 25
PRINTER RIBBONS—Most Types . . . . . $Call

Our People, Our Product: Both Are Specialized.

Red Baron is an organization of computer printer specialists. They know the capabilities of each printer, and how to match one to your exact need. Call for expert consultation today!

MasterCard VISA

Here's How To Order:

Phone orders are welcome; same-day shipment on orders placed before 11:00 a.m. Free use of MasterCard and Visa. COD's accepted. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision. APO/FPO Orders Welcome.

Call For Free Catalog:

(800) 854-8275

CA, AK, HI (714) 630-3322

Red Baron™ COMPUTER PRODUCTS

1100 N. TUSTIN #207
ANAHEIM, CA 92807

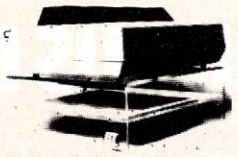
CIRCLE 247 ON READER SERVICE CARD

© Red Baron Computer Products, 1982

THE COMPUTER CONNECTION

New Toll Free Order Number

Printer Stands



End the paper mess on your computer desk. Our printer stand allows your paper to be fed from under the printer, making room for the used paper to stack behind the print out of the way. Available with an optional removable shelf (Shown) for easy computer forms change. Available in Large size also, for MX-100 and other large printer users also. Also available with center slot for bottom feed printers.

Regular Stand	(300010)	$29.95
Regular w shelf	(300011)	$44.95
Large Stand	(300020)	$34.95
Large w shelf	(300021)	$49.95
Large w slot	(300050)	$49.95

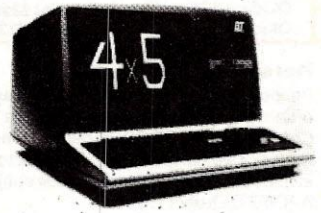
B.T. Hard Disks

We want you to have all the power that your TRS-TRS-80 is capable, at prices that have other manufacturers cross-eyed! These Five, Ten and Fifteen Megabyte units are easy to use, just plug them into the expansion buss of your Model I or Model III. Comes complete with the fantastic DOS PLUS 4.0 Operating System! Available in configurations: 5 Megabyte Fixed, 10 Megabytes, 15 Megabyte Fixed. Look at the incredible low prices of our systems!

SYSTEM PRICING

5 Megabyte Winchester Fixed Disk		
201505	Model I Version	$2399.95
203505	Model III Version	2399.95
10 Megabyte Winchester Fixed Disk		
201510	Model I Version	$2549.95
203510	Model III Version	$2549.95
15 Megabyte Winchested Fixed Disk		
201520	Model I Version	$2699.95
203520	Model III Version	$2699.95

Add $10.00 shipping and handling



AVAILABLE NOW
4 Mhz
x
5 Megabytes
under
$4000

Connection-80 BBS

State of the Art in Microcomputer Bulletin Board Programs for the TRS-80. Available for Mod I (101000) or Mod III (103000) $199.95.

Electric Pencil Ver 2.1.

This is the easiest to use word processor for the TRS-80 Models I III. Easy to follow instruction manual, full documentation. Regularly $89.95 Holiday Special $59.95!

Electronic Messenger

Completely automated electronic mail program for the Model III. Transmitts and receives mail automatically. From a short note to a full disk! The standard in Electronic Mail for all Computers (103013) $149.95. (Now only $59.95!!!!!)

Postman Mass Mailing System

This Mass Mailing Package is without a doubt the most powerful mailing list program ever written! Info-World gave it a 4 excellent (highest) rating! Regularly $129.95. Holiday Special $99.95

M-Zal

The most powerful Editor Assembler ever written. Full screen editing, linking loader, full macro support and much more! Holiday special only (101007) $99.95.

Dosplus 3.4 Operating System

You've read all about this incredible Operating System. With all its' features only the price could improve it. Sooo... Holiday Special $79.95!!!

(101005) Model I Single Density
(101006) Model I Double Density
(103006) Model III

Uniterm

A Modular Terminal program for both the Model I & III. Full Up and down loading capabilities with a 38K buffer in a 48K mackline! 113000 $79.95.

TRS-80 is a trademark of the Tandy Corp.

***All Holiday Specials End 1-15-83!!!** Postmarks after that date will not be accepted at these prices!!

B.T. Enterprises
10B Carlough Road
Bohemia, N.Y. 11716
516 567 8155 (voice)
516 588 5836 (modem)

Add $2.00 Shipping and Handling
Dealer Inquires Welcome
Prices subject to change
N.Y.S. Residents Add Tax

B.T. Enterprises is a division of Bi-Tech Enterprises Inc.

New Toll Free Lines for out of New York State orders
800 645 1165

MasterCard VISA **WELCOME**

CIRCLE 123 ON READER SERVICE CARD

Listing 5. These lines, along with Listings 1 and 2, create the pop art figure shown in Figure 7.

```
90    PEN=1
95    R=XRES/7
100   FOR I=0 TO 45 STEP 1.1
110   A=R*SIN(2*I)
120   B=R*COS(I+3.14159/4)
130   C=R*(SIN(I)+COS(I))
140   JP=I/1.1
150   PEN=INT(JP/7)+1
160   IF I=0 THEN PEN=0
170   GOSUB 1000
180   GOSUB PLOT
190   NEXT I
```

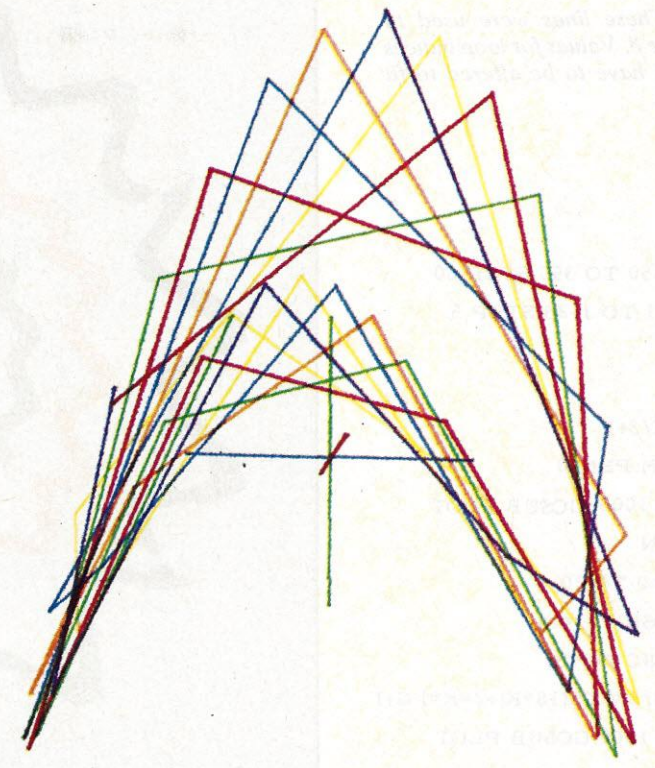
to plot stereo images of anything which can be described as a set of (a, b, c) points. These points can be calculated by the computer or input as data.

Now that we have both ends of a program, let's fill in the middle with some listings to make the drawings shown here. By the time we get through these, I am sure you will have some good ideas of your own.

If your plotting device is a video display, the resolution will probably be inadequate to show all the detail in these drawings. You may have to modify the listings to draw fewer lines. You can, of course, plot them from any viewpoint and rotation. With a video recorder, you could probably even make an animated sequence, one frame at a time.

Remember that GOSUB PLOT refers to your plotting subroutine, which simply draws a line from wherever it is now, to the point (m, n), using the color number of the PEN variable. PEN=0 means to move to the new point without drawing. The drawings shown here use up to seven different colors.

The listings which follow must be combined with Listings 1 and 2 to make an executable Basic program.



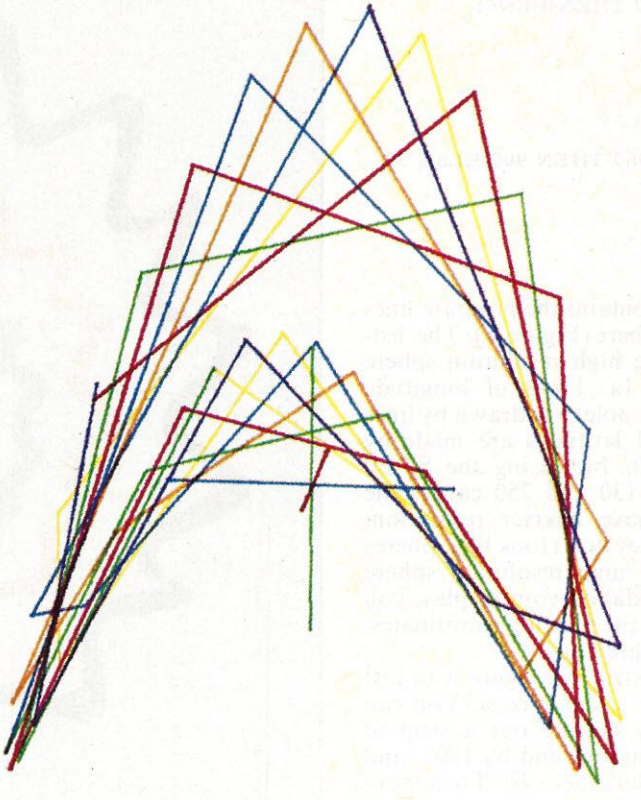


Figure 7. 3-D string art.

Listing 6. These lines were used to create Figure 8. Values for loop indices I and J may have to be altered to fit your display.

```
25  PS=0
100 PEN=1
110 FG=-1
120 FOR J=50 TO 350 STEP 60
130 FOR I=J TO J+25 STEP 5
140 A=I
150 B=0
160 C=FG*I/3+I
170 PN=PEN:PEN=0
180 GOSUB 1000:GOSUB PLOT
190 PEN=PN
200 FOR K=0 TO 20
210 A=I*COS(CF*3*K)
220 B=I*SIN(CF*3*K)
230 C=FG*I/3*COS(18*K)+2*K*FG+I
240 GOSUB 1000:GOSUB PLOT
250 NEXT K
260 NEXT I
270 PEN=PEN+1
280 IF PEN=7 THEN PEN=1
290 FG=-FG
300 NEXT J
310 PS=PS+60
320 IF PS>=360 THEN 900 ELSE 30
925 PS=0
930 GOTO 30
```

Listing 3 contains the program lines to make a sphere (Figure 5). The listing is for the high resolution sphere of Drawing 1a. Lines of longitude (from pole to pole) are drawn by lines 120–220, and latitudes are made by lines 230–330. Increasing the STEP size in lines 130 and 250 causes the spheres to have coarser resolution. Eventually they don't look like spheres at all. If the high resolution sphere looks ellipsoidal on your display, you need to scale the plotting coordinates, as described previously.

A mobius strip is a figure with just one side and a single edge. You can make one by cutting out a strip of paper, rotating one end by 180°, and taping it to the other end. To demonstrate that it has just one side, draw a line down the middle of the strip. Keep drawing until you end up where you started. You will be able to see that the

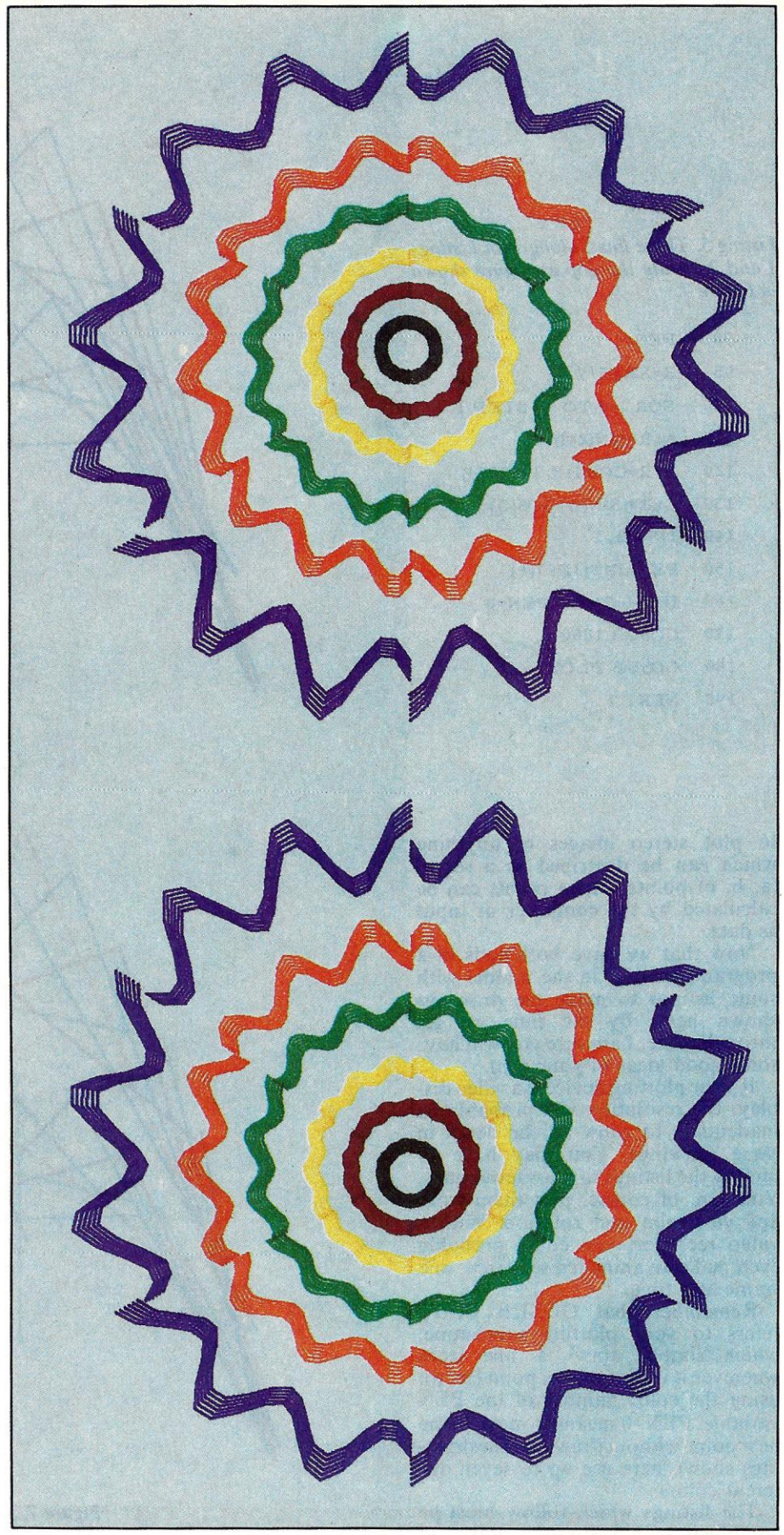


Figure 8.

AARDVARK — THE ADVENTURE PLACE

ADVENTURES FOR OSI, TRS-80, TRS-80 COLOR, SINCLAIR, PET, VIC-20

ADVENTURES — Adventures are a unique form of computer game. They let you spend 30 to 70 hours exploring and conquering a world you have never seen before. There is little or no luck in Adventuring. The rewards are for creative thinking, courage, and wise gambling — not fast reflexes.

In Adventuring, the computer speaks and listens to plain English. No prior knowledge of computers, special controls, or games is required so everyone enjoys them—even people who do not like computers.

Except for Quest, itself unique among Adventure games, Adventures are non-graphic. Adventures are more like a novel than a comic book or arcade game. It is like reading a particular exciting book where you are the main character.

All of the Adventures in this ad are in Basic. They are full featured, fully plotted adventures that will take a minimum of thirty hours (in several sittings) to play.

Adventuring requires 16k on Sinclair, TRS-80, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Sinclair requires extended BASIC.

TREK ADVENTURE by Bob Retelle — This one takes place aboard a familiar starship and is a must for trekkies. The problem is a familiar one — The ship is in a "decaying orbit" (the Captain never could learn to park!) and the engines are out (You would think that in all those years, they would have learned to build some that didn't die once a week). Your options are to start the engine, save the ship, get off the ship, or die. Good Luck.

Authors note to players — I wrote this one with a concordance in hand. It is very accurate — and a lot of fun. It was nice to wander around the ship instead of watching it on T.V.

CIRCLE WORLD by Bob Anderson — The Alien culture has built a huge world in the shape of a ring circling their sun. They left behind some strange creatures and a lot of advanced technology. Unfortunately, the world is headed for destruction and it is your job to save it before it plunges into the sun!

Editors note to players — In keeping with the large scale of Circle World, the author wrote a very large adventure. It has a lot of rooms and a lot of objects in them. It is a very convoluted, very complex adventure. One of our largest. Not available on OSI.

HAUNTED HOUSE by Bob Anderson — This one is for the kids. The house has ghosts, goblins, vampires and treasures — and problems designed for the 8 to 13 year old. This is a real adventure and does require some thinking and problem solving — but only for kids.

Authors note to players—This one was fun to write. The vocabulary and characters were designed for younger players and lots of things happen when they give the computer commands. This one teaches logical thought, mapping skills, and creativity while keeping their interest.

DERELICT by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

Authors note to players — This adventure is the new winner in the "Toughest Adventure at Aardvark Sweepstakes". Our most difficult problem in writing the adventure was to keep it logical and realistic. There are no irrational traps and sudden senseless deaths in Derelict. This ship was designed to be perfectly safe for its' builders. It just happens to be deadly to alien invaders like you.

NUCLEAR SUB by Bob Retelle — You start at the bottom of the ocean in a wrecked Nuclear Sub. There is literally no way to go but up. Save the ship, raise her, or get out of her before she blows or start WWIII.

Editors note to players—This was actually plotted by Rodger Olsen, Bob Retelle, and someone you don't know — Three of the nastiest minds in adventure writing. It is devious, wicked, and kills you often. The TRS-80 Color version has nice sound and special effects.

EARTHQUAKE by Bob Anderson and Rodger Olsen — A second kids adventure. You are trapped in a shopping center during an earthquake. There is a way out, but you need help. To save yourself, you have to be a hero and save others first.

Authors note to players — This one feels good. Not only is it designed for the younger set (see note on Haunted House), but it also plays nicely. Instead of killing, you have to save lives to win this one. The player must help others first if he/she is to survive — I like that.

PYRAMID by Rodger Olsen — This is one of our toughest Adventures. Average time through the Pyramid is 50 to 70 hours. The old boys who built this Pyramid did not mean for it to be ransacked by people like you.

Authors note to players — This is a very entertaining and very tough adventure. I left clues everywhere but came up with some ingenous problems. This one has captivated people so much that I get calls daily from as far away as New Zealand and France from bleary eyed people who are stuck in the Pyramid and desperate for more clues.

QUEST by Bob Retelle and Rodger Olsen — THIS IS DIFFERENT FROM ALL THE OTHER GAMES OF ADVENTURE!!!! It is played on a computer generated map of Alesia. You lead a small band of adventurers on a mission to conquer the Citadel of Moorlock. You have to build an army and then arm and feed them by combat, bargaining, exploration of ruins and temples, and outright banditry. The game takes 2 to 5 hours to play and is different each time. The TRS-80 Color version has nice visual effects and sound. Not available on OSI. This is the most popular game we have ever published.

MARS by Rodger Olsen — Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian city, repair your ship and deal with possibly hostile aliens to get home again.

Authors note to players — This is highly recommended as a first adventure. It is in no way simple—playing time normally runs from 30 to 50 hours — but it is constructed in a more "open" manner to let you try out adventuring and get used to the game before you hit the really tough problems.

ADVENTURE WRITING/DEATHSHIP by Rodger Olsen — This is a data sheet showing how we do it. It is about 14 pages of detailed instructions how to write your own adventures. It contains the entire text of Deathship. Data sheet - $3.95. NOTE: Owners of OSI, TRS-80, TRS-80 Color, and Vic 20 computers can also get Deathship on tape for an additional $5.00.

PRICE AND AVAILABILITY:

All adventures are $14.95 on tape except Earthquake and Haunted House which are $9.95. Disk versions are available on OSI and TRS-80 Color for $2.00 additional.

Please specify system on all orders

ALSO FROM AARDVARK — This is only a partial list of what we carry. We have a lot of other games (particularly for the TRS-80 Color and OSI), business programs, blank tapes and disks and hardware. Send $1.00 for our complete catalog.

AARDVARK - 80
2352 S. Commerce, Walled Lake, MI 48088
(313) 669-3110

VISA

master charge

Phone Orders Accepted 8:00 a.m. to 4:00 p.m. EST. Mon.-Fri.

TRS-80 COLOR **SINCLAIR** **OSI** **VIC-20**

CIRCLE 101 ON READER SERVICE CARD

BUY SOME TIME FOR $169

Time is money. You have a computer system because you know that it saves you money by simplifying procedures and reducing time normally involved in your work. Time is an important resource which should not be wasted. You are wasting valuable time if you ever wait for your printer.

No waiting. Now with Microfazer by Quadram there is no more waiting.

Microfazers are inexpensive universal printer buffers which any computer user cannot afford to be without. Any computer—any printer (or plotter!), whether parallel or serial. Microfazer receives information from the computer at ultra high speeds causing the computer to think the printer is printing just as fast as the computer can send. Microfazer holds the information until your printer can handle it, and then sends it on.

More copies. Microfazer is equipped with a copy feature allowing additional copies of the buffered information—from one to as many as you want—with the mere press of a button. When you need your information repeated, for whatever reason, it's always right there—inside Microfazer.

Microfazer™ stack. Microfazer can be stacked with popular modems or other peripherals. Some models can plug directly onto the back of your printer. Install it in less than 60 seconds, and choose the amount of buffer memory you need—8K, 16K, 32K, or 64K. One model even comes with up to 512K! You may use several Microfazers in series to create just what's right for you. Take data in from a serial computer and out to a parallel printer. Or in from a parallel computer and out to a serial printer. Microfazer is just as flexible as you need it to be.

Low price. Only $169 for 8K of buffering, $189 (16K), $225 (32K) and $299 for a full 64K. Serial-to-Parallel, Parallel-to-Serial and Serial-to-Serial models have slightly higher prices.

QUADRAM CORPORATION

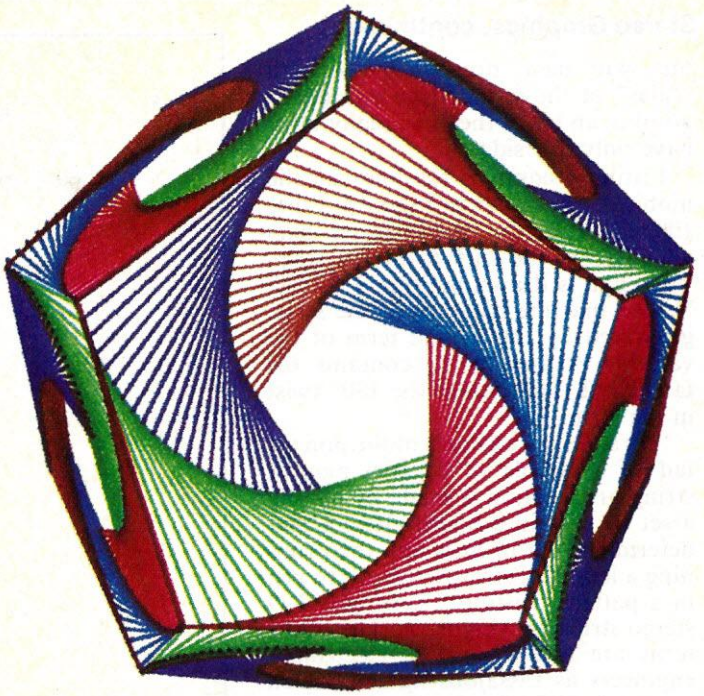
4357 Park Drive / Norcross, Ga. 30093
(404) 923-6666

CIRCLE 240 ON READER SERVICE CARD

Special version for attaching directly to the popular Epson printer.

Listing 7. Lines for dodecahedron of Figure 9.

```
10   DIM XX(6), YY(6)
20   PH=0:TH=0:PS=0:CF=3.14159/180
30   INPUT "XRES, YRES";XRES, YRES
40   Y=0:X=-XRES/20:Z=1.5*XRES:Q=XRES/4:W=YRES/2
50   LL=XRES/100:AP=0:CO=0:IB=0:C=0
60   PEN=1
70   CS=COS(CF*PS):SS=SIN(CF*PS)
80   CP=COS(CF*PH):SP=SIN(CF*PH)
100  CT=COS(CF*TH):ST=SIN(CF*TH)
110  J=0:L=LL
120  FOR I=1 TO 5
130  XX(I)=.15*XRES*COS(CF*J)
140  YY(I)=.15*XRES*SIN(CF*J)
150  J=J+72
160  NEXT I
170  PEN=0
180  XX(6)=XX(1):YY(6)=YY(1)
190  A=XX(5):B=YY(5):C=0
200  GOSUB 1000:GOSUB PLOT
210  PEN=5
220  A=XX(1):B=YY(1)
230  GOSUB 1000:GOSUB PLOT
240  FOR I=1 TO 5
250  PEN=I
260  A=XX(i):B=YY(i)
270  GOSUB 1000:GOSUB PLOT
280  R=((XX(I+1)-XX(I))^2+(YY(I+1)-YY(I))^2)^.5
290  QQ=(XX(I+1)-XX(I))*L/R
300  WW=(YY(I+1)-YY(I))*L/R
310  XX(I)=XX(I)+QQ
320  YY(I)=YY(I)+WW
330  NEXT I
340  XX(6)=XX(1):YY(6)=YY(1)
350  L=L*.97
360  IF R<120 THEN 380
370  GOTO 240
380  PH=243
390  AP=-243*(1+COS(63*CF))
400  CO=-243*SIN(63*CF)
410  IF IB=1 THEN PS=PS+72
420  IB=1
430  IF PS=360 THEN 900
440  GOTO 70
900  IF Q=XRES/4 THEN 910 ELSE END
910  Q=Q+XRES/2
920  X=-X
930  TH=0:PH=0:PS=0
940  GOTO 50
1000 A1=A*CP-C*SP
1010 C2=A1*SP+C*CP
1020 A=A1:B1=B
1030 B=B1*CT-C2*ST
1040 C=C2*CT+B1*ST
1050 A=A+AP:C=C+CO
1060 A4=A*CS-B*SS
1070 B4=A*SS+B*CS
1080 A=A4:B=B4
1090 CZ=C/(Z-C)
1100 M=A+(A-X)*CZ+Q
1110 N=B+(B-Y)*CZ+W
1120 RETURN
```



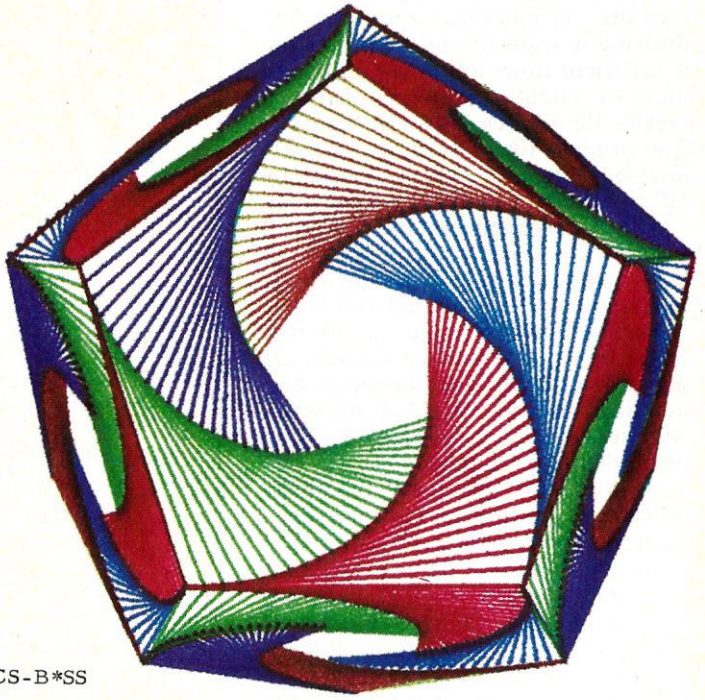


Figure 9. This dodecahedron was created using rotation and translation of a single pentagon.

line you have drawn covers both "sides" of the strip. Since you didn't go over an edge, the strip really must have only one side.

Listing 4 contains the lines for the mobius strip shown in Figure 6. Lines 100–230 draw in the colored bars which form the surface of the strip. The edge is drawn by lines 250–320. Notice that the rotation of the strip, generated by the second term of the variable A and by C, contains the factor I/2. This causes the 180° twist in the strip.

"String Art" was part of the pop art fad of a couple of decades ago. A string art creation is made by nailing a set of pegs in a board along a predetermined set of lines and then running a length of string from peg to peg in a pattern. Listing 5 generates 3-D stereo string art (Figure 7). These patterns are also known to electronics engineers as Lissajous figures, which are created by using harmonics of sine waves to generate the a and b object coordinates. Of course, we will throw in a component in the Z direction for depth.

To make different figures, try varying the STEP size in line 100 and the arguments of the trig functions in lines 110–130.

Figure 8 illustrates the possibility of creating symmetrical patterns by drawing a segment and then rotating it sufficient times about the Z axis to make a circular pattern. Listing 6 creates the figures shown in Figure 8. The original figure is drawn in a 60° angular segment. This is rotated by 60° five times to complete the drawing.

The dodecahedron of Figure 9 extends this concept to translation as well as rotation. It consists of a single pentagon which is rotated and translated five times to make the top half of the figure. The bottom six sides are not drawn, giving the illusion of hidden line removal. Part 2 of this series will include a detailed consideration of hidden line removal.

As with most string art, the object appears to contain curved lines, even though only straight lines are used in drawing it. Because the generation of the dodecahedron requires rotation, translation, and then another rotation, extensive modification of Listing 1 is necessary. Listing 7 contains the *entire* program for generating the dodecahedron.

Finally, I leave you with the blown dandelion of Figure 10. The RND (random) function was used in generating the coordinates for the fuzz, so this one comes out different each time it is drawn. The one you see here will probably never be duplicated. If you want a listing for this program, you must first blow off the rest of the fuzz, then send me an SASE for the listing. So go ahead. Make a wish and blow. Then make some nice pictures of your own. And watch out for those bats at the movies. See you next month when we will discuss the creation of mesh plots of functions of two variables and hidden line removal. □

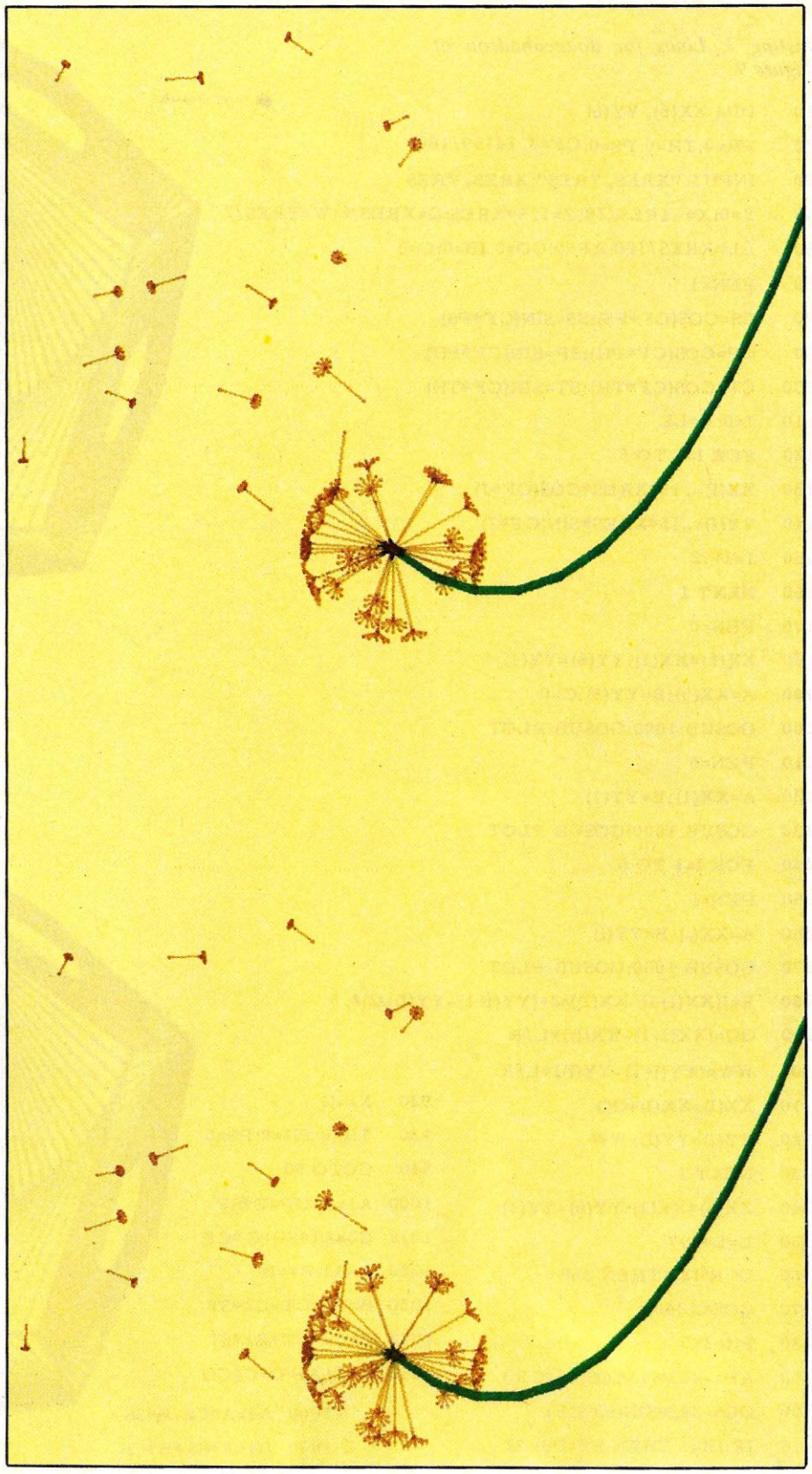


Figure 10. Dandelion with airborne fuzz.

OF ALL THE THINGS YOU BUY, HOW MANY ARE GOOD ENOUGH TO BE WARRANTED 5 YEARS?

Few disks stand the test of time. Because few are built to the precision standards or certified to the critical levels of Omni's complete line.

Each Omni disk is rated for 12 million passes without disk-related errors or significant wear. Each is certified error-free at a minimum of twice the error-threshold of your system. And built to exceed all industry specifications including those of ANSI, ECMA, ISO and virtually every drive manufacturer. So you can count on them for the long haul. We guarantee it.

Call toll-free (800 343-7620) for your nearest dealer. In Mass., call 617 799-0197.

Omni Resources, 4 Oak Pond Ave., Millbury, Mass. 01527

Dealers. Software houses.
Check our prices, services and specifications. We offer duplicating, formatting, private labeling, small minimums, fast delivery and copy protection schemes on disks for virtually any system.

OMNI

THE DISK GOOD ENOUGH TO BE WARRANTED 5 YEARS

CIRCLE 221 ON READER SERVICE CARD

Yes, we're the biggest.

But that isn't what makes us number one.

It's the totality of what we do to make microcomputers more effective for you that makes us number one.

Yes. We have the largest number of packages—simple and complex. Yes. We have the greatest number of formats. Yes. We have the best technical support in the business. Yes. All of our products are immediately available.

But let's take a step back. When the microcomputer world opened up there was little definition and no software. Then came Lifeboat—to meet the need for easy-to-use, fully-tested, reliable software backed by extensive and available service.

Lifeboat developed standards for the industry which led to improved quality, reduced costs, higher levels of technical competence, credibility and reduced user risk.

Today Lifeboat offers personal, professional and corporate end-users, as well as dealers, distributors, authors, OEMs and others, a unique, single-source, full-service Software Support System.™

Everyone looks to us as the source of the most comprehensive, fully-tested line of software. Word processing, financial planning, accounting, graphics, data base management, languages and more. We have it all—for nearly every microcomputer available, including the IBM PC.

Our customer service department provides facilities for mail, telephone, TWX, telex and personal sales. We have a network of offices in the U.S., England, France, Japan, Switzerland and West Germany.

We provide a Software Desk Reference™ which contains up-to-date information about state-of-the-art software books, periodicals and accessories.

We offer subscriptions to *Lifelines*™ The Software Magazine.™ A monthly publication covering new products, tips for microcomputer users, product comparisons and other features to guide the reader before and after a purchase.

As the largest publisher of software, we also print a guide setting standards for software authors.

It takes a lot to become big but it takes even more to become—and remain—number one.

That's our commitment.

Lifeboat Associates, 1651 Third Avenue, New York, New York 10028.
TWX: 710-581-2524 (LBSOFT NYK). TELEX: 640693 (LBSOFT NYK).

☐ Please send me a free Lifeboat Software Desk Reference filled with descriptions of over 200 programs designed for use in professional, business, programming and personal environments.

☐ Please send further information on *Lifelines* and Author's Guide.

Name _____ Title _____

Company _____ Bus. Phone _____

Street _____

City _____ State _____ Zip _____

Lifeboat Associates
World's No. 1 source of micro software CC

Lifelines, The Software Magazine.™ Lifelines Pub. Co.
Software Support System, Software Desk Reference,™ Lifeboat Assoc.
Copyright © 1982, by Lifeboat Associates.

CIRCLE 194 ON READER SERVICE CARD

NEW 16-Bit Software Available for the IBM PC, plus...

System Tools:
Emulator/86
EM80/86
PMATE-86
UT86
PANEL-86

Telecommunications:
ASCOM

Languages:
Lattice C Compiler
PL/M

Word Processing Systems And Aids
WordStar
MailMerge
MicroSpell
Spellguard

Data Management Systems:
T.I.M. III

Mailing List Systems
Postmaster

Financial Accounting Packages
General Ledger

Numerical Problem-Solving Tools
Math PC
Plan86
SigmaCalc
Statpak

Professional And Office Aids
Dental Mngmnt Sys. (8000 & 9000)
Insurance Agency
Legal Time Acctng.
Medical Mngmnt Series (8000 & 9000)

Disk Operating Systems:
MS-DOS (SB-86) — available for OEM license.

8-Bit Software Available

System Tools:
BUG and uBUG
DESPOOL
DISILOG
DISTEL
EDIT
EDIT-80
FILETRAN
IBM/CPM
MAC
MACRO-80
MINCE
PANEL
PASM
PLINK
PLINK II
PMATE
RAID
Reclaim
SID
TRS-80 Model II Cust. Disk Unlock
WordMaster
XASM: 05, 09, 18, 48, 51, 65, 68, 75, F8, 400, Z8
ZAP80
ZDT
Z80 Development Package
ZSID

Telecommunications:
ASCOM
BSTAM
BSTMS
eZmail
MicroLink-80
RBTE-80

Languages:
ALGOL-60
APL/V80
BASIC Compiler
BASIC-80
baZic II
BD Software C Compiler
CBASIC-2
CIS COBOL (Standard)
COBOL-80
FORTRAN-80
KBASIC
JRT Pascal
muLISP/muSTAR
Nevada COBOL
Pascal/M
Pascal/MT
Pascal/M +
Pascal/Z
PL/I-80
Precision BASIC
STIFF UPPER LISP
S-BASIC
Timin FORTH
Tiny-C
Tiny-C TWO
UCSD Pascal
Whitesmiths' C Compiler
XYBASIC

Language and Applications Tools:
BASIC Utility Disk
DataStar
FABS
FABS II
Forms 2 for CIS COBOL
MAG/sam3,4
MAG/sort
M/SORT for COBOL 80
Programmer's Apprentice
PSORT
QSORT
STRING/80
STRING BIT
SuperSort
ULTRASORT II
VISAM

Word Processing Systems and Aids:
Benchmark
DocuMate/Plus
Letteright
MagicPrint
Magic Wand
Math ★
MicroSpell
SMARTKEY
Spellguard
TEX
Textwriter III
WordIndex
WordStar
WordStar French
WordStar Customization Notes

Data Management Systems:
CONDOR
dBASE II
Formula
HDBS
Hoe
MAG/base1,2,3
MDBS
MicroSEED
T.I.M. III

General Purpose Applications:
CBS
CBS Label Option Pak
Selector III-C2
Selector IV

Mailing List Systems:
Benchmark Mailing List
Mailing Address
MailMerge for WordStar
NAD
Postmaster

Financial Accounting Packages:
BOSS Financial Accounting System
Financial Pkgs. (PTree)
Financial Pkgs. (SSG)
General Ledger Acctng (Univair)
GLector

Numerical Problem-Solving Tools:
Analyst
fpl
Microstat
muSIMP/muMATH
PLAN80
SigmaCalc
Statpak
T/MAKER II

Professional And Office Aids:
Apartment Mngmnt (Cornwall)
Datebook
Dental Mngmnt (Univair)
Dental Mngmnt–Family (Univair)
GrafTalk
Insurance Agency Mngmnt
Legal Time Acctng (Univair)
Medical Mngmnt (Univair)
Medical Mngmnt–Family (Univair)
PAS 3 Medical
PAS 3 Dental
Professional Time Acctng (PTA)
Property Mngmnt Pkg. (Am. Soft.)
Property Management (PTree)
Sales Pro
Wiremaster

Lifeboat After Hours
Backgammon/Gomoku

Educational Tools
Torricelli Author
Torricelli Studio

Books and Periodicals
APL—An Interactive Approach
Accounts Payable and Accounts Receivable-CBASIC
CBASIC User Guide
The Computer Glossary
The CP/M Handbook (with MP/M)
The C Programming Language
Crash Course in Microcomputing
Devil's DP Dictionary
Discover FORTH
DON'T (Or How To Care For Your Computer)
8080/Z80 Assembly Language Techniques For Improved Programming
Executive Computing
Fifty BASIC Exercises
General Ledger-CBASIC
Introduction to Pascal
Lifelines/The Software Magazine
Pascal User Manual and Report
The Pascal Handbook
The Pascal Primer
Payroll with Cost Accounting —CBASIC
Structured Microprocessor Programming
A User Guide To The UNIX System
Using CP/M—A Self-Teaching Guide

Hardware and Accessories
DC Data Cartridges
Diskette Drive Head Cleaning Kits
Flippy Disk Kit
Floppy Saver
Smartmodem
Vari Clean Cleaning Kit

Disk Operating Systems
BRIDOS
CP/M-80
MP/M
SB-80
APPLI-CARD
Softcard

Hard Disk Integration Modules

Media & Formats for 8-AND 16-Bit Microcomputers

This list of available formats is subject to change without notice. If you do not see your computer listed or are uncertain, call to confirm the format code for any particular equipment.

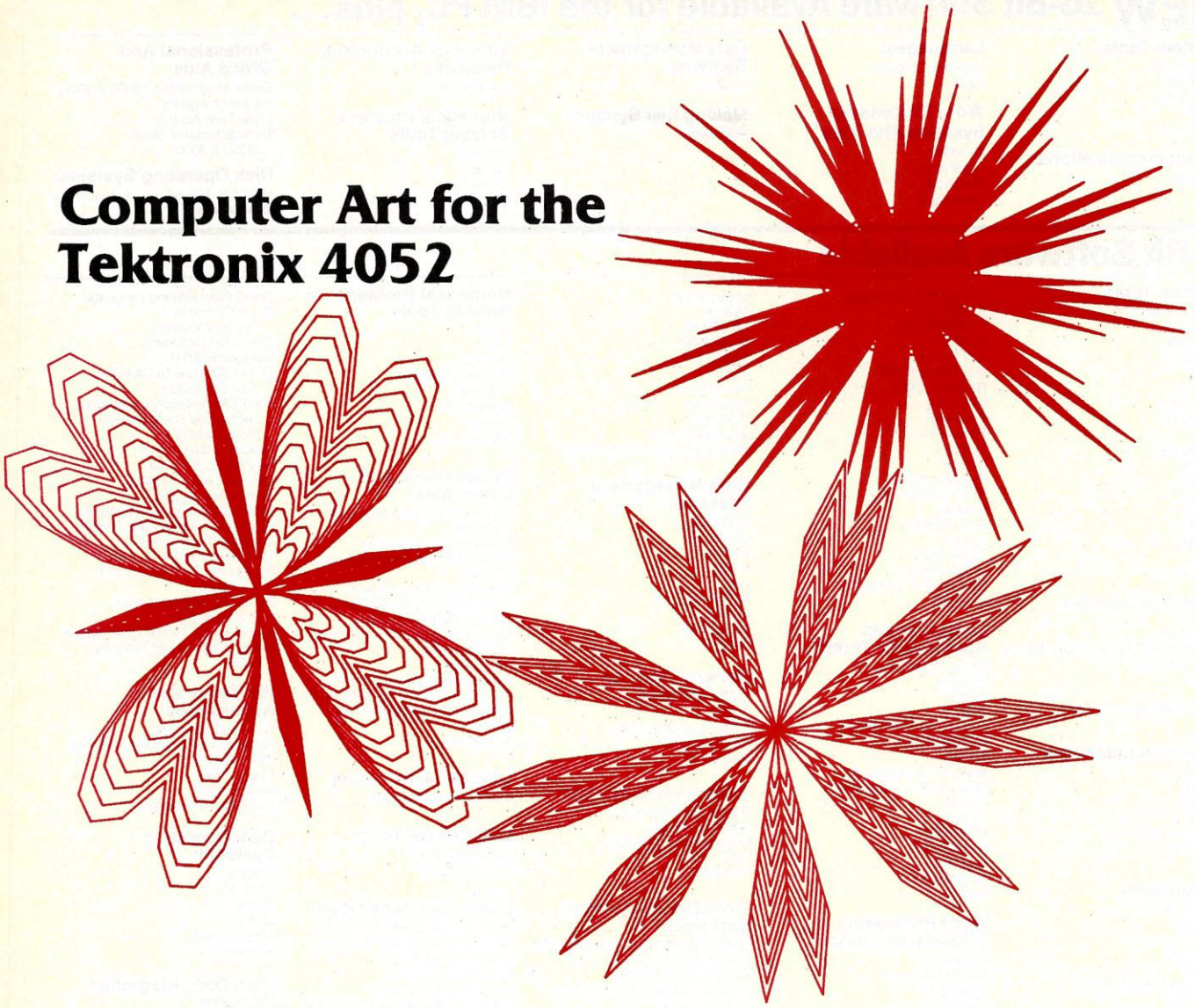
A.B. Dick....M8
ADDS Multivision....RT
AES Super Plus IV....Q4
ALSPA 8"....A1
Altair 8800....B1
Altos....A1
Apple CP/M-80 13 Sector....RG
Apple CP/M-80 16 Sector....RR
Archives 1....SG
AVL Eagle I....RB
AVL Eagle II....ST
BASF System 7100....RD
Blackhawk Micropolis Mod II....Q2
BMC iF-800....SR
Cado....A1
California Computer Sys 8"....A1
CDS Versatile 3B....Q1
CDS Versatile 4....Q2
Columbia Data Products 8"....A1
Columbia Data Products 5¼"....S4
Commodore CBM/PET + SSE Box + 8050....C2
Commodore CBM/PET w/Madison Z-RAM + 8050....C4
COMPAL-80....Q2
Compucorp 655....Q7
Compucorp 685....Q6
Computer Ops N.C. HQ....S2
Control Data 110....A1
CPT 8000....A1
Cromemco System 3....A1
Cromemco System 2 SD/SS....R6
Cromemco System 2 DD/SS....RX
Cromenco System 2 DD/DS....RY
CSSN Backup....T1
Datapoint 1550/2150 DD/SS....AA
Datapoint 1550/2150 DD/DS....AB
Datavue DU 80-222....M7
DEC VT 18X....SD
Delta Systems....A1
Digi-Log Microterm II....RD
Digi-Log Sys. 1000/1500/2000....RD
Direct OA1000....M2
DTC Micro 210A....SC
Durango F-85....RL
Dynabyte DB8/2....R1
Dynabyte DB8/4....A1
Exidy Sorcerer + LB CP/M-80 5¼"....Q2
Exidy Sorcerer + Exidy CP/M-80 5¼"....RW
Exidy Sorcerer + Exidy CP/M-80 8"....A1
EXO....A1
Exxon 510/520....Q5
Findex....P6
Godbout....E1
Heath H8 + H47....A1
Heath H89 + Magnolia CP/M-80....P7
Heath H89 + Heath CP/M-80....P7
Helios II....B2
Heurikon MLZ, SS....SN
Heurikon MLZ, DS....SO
Heuristics HCC Spectrum....A1
Hewlett-Packard-87....SB
Hewlett-Packard 125, 5¼"....SB
Hewlett-Packard 125, 8"....A1
IBEX 7100....RQ
IBM Personal Computer....G1
ICL Personal Computer....RE
iCOM 2411 Micro Floppy....R3
iCOM 3712....A1
iCOM 3812....A1
iCOM 4511 Cartr. CP/M v.1.4....D1
iCOM 4511 Cartr. CP/M v.2.x....D2
IMSAI VDP-40/VDP-42....R4
IMSAI VDP-44....R5
IMSAI VDP-80....A1
Industrial Microsystems 5000....RA
Industrial Microsystems 8000....A1
Intel iPDS....M6
Intel MDS SD....A1
Intersil Development Sys....A1
Inter Systems Ithaca 800....A1
Intertec Superbrain DOS 0.5-2.x....RJ
Intertec Superbrain DOS 3.x....RK
Intertec Superbrain QD....RS
ISC Intecolor 8063/8360/8963....A1
Lanier EZ-1....M3
Lanier Super....Q4
Lexitron VT 1303 DS/DD....S8
Lexor Alphasprint Model S1....S1
Lexor Lexoriter....S1
Meca Delta-1 5¼"....P6
MICOM 2001....B3
MICOM 2001E....B4
MICOM 3003....M1
Micromation....A1
MicroMega 85....SC
Micropolis Mod 1....Q1
Micropolis Mod II....Q2
MITS 3200-3202....B1
Monroe OC 8820, DD/SS....SW
Morrow Discus....A1
Mostek....A1
MSD 5¼"....RC
MULTI-TECH-I....Q2
MULTI-TECH-II....Q2
Nascom (Gemini drives)....R3
Nascom II with Lucas Drives....SL
National MSC 6600....A1
NCR 8140/9010....A1
NEC PC-8001....RV
Nicolet Logic Analyzer Model 764....SX
NNC-80/80W....A1
North Star SD....P1
North Star DD....P2
North Star QD....P3
Northern Telecom 503....SM
Nylac Micropolis Mod II....Q2
Ohio Scientific C3....A3
OKI iF-800 + MSA CP/M-80....SP
OKI iF-800 + OKI/LB CP/M-80....SR
Osborne-1....SA
Otrona Attache....MC
Pertec PCC 2000....A1
PET/CBM + SSE Bx + 8050....C2
PET/CBM w/Madison Z-RAM + 8050....C4
Philips P-2000....MA
Philips MICOM 2001 8"....B3
Philips MICOM 2001E....B4
Philips MICOM 3003....M1
Processor Technology Helios II....B2
Quasar QDP100....A1
Quay 500....RQ
Quay 520....RP
Quay 900....A1
RAIR DD....RE
RAIR SD....R9
Research Machines 5.¼"....RH
Research Machines 8"....A1
Sanco 7000 5"....RQ
Sanyo MBC 1000....SY
Sanyo MBC 2000....SS
Sanyo MBC 3000....A1
Seattle....E1
Sony....U1
SD Systems 5¼"....R3
SD Systems 8"....A1
Spacebyte....A1
Tarbell 8"....A1
TecMar....E1
TEI 5¼"....R3
TEI 8"....A1
Televideo DD/DS....S5
T.I.P. (Alloy Engineering, Inc.)....T3
Toshiba T200....SF
Toshiba T250....A1
Triumph Adler Alphatronic....SV
TRS Model I + Omikron 5¼"....RM
TRS Model 1 + FEC Freedom....RN
TRS-80 Model 1 + Shuffleboard....A1
TRS-80 Model II....A1
Vector MZ....Q2
Vector System 2800....A1
Vector System B/VIP....Q2
Vista V-80 5¼" SD....R8
Vista V200 5 DD....P6
Wangwriter....SE
WORDPLEX....SZ
XEROX 820, 5¼"....S6
XEROX 820, 860 8"....A1
ZEDA 580....SH
Zenith Z89 + Magnolia CP/M-80....P7
Zenith Z89 + Zenith CP/M-80....P7
Zenith DD/SS....SK
Zenith DD/DS....SJ
Zilog MC 22-20/25/50....A1

Program names and computer names are generally trademarks or service marks of the author or manufacturing company.

All Lifeboat (LB) 8-bit software requires SB-80 (or other CP/M-80 compatible disk operating system) unless otherwise stated.

All products are subject to terms and conditions of sale.

Computer Art for the Tektronix 4052



Joe Jacobson

A common motif in analytical computer art is the polar coordinate curve. This has the form R=f(A), where R is the radius, f is a mathematical function, and A is the angle. The angle parameter A is swept through some range of values, the radius R is calculated, and the computed polar coordinate points (R,A) are converted to rectangular coordinates and plotted.

The resulting curves frequently (but not always) exhibit angular symmetry; that is, they look the same after being rotated through a suitable angle.

Like many other computer artists, I had played with polar coordinate designs from time to time, but it seemed to me that the possibilities were limited with these curves. You generally ended up with designs like those in Figures 1 and 2, which are similar to the polar coordinate curves found in high school texts on analytic geometry.

Joe Jacobson, 675 E. Street Road., Apt. 1009, Warminster, PA 18974.

It was with considerable interest that I became aware of an innovation in polar curve plotting by a fellow computer artist and engineering co-worker, Woodrow Europa. Woodrow repeatedly swept simple polar coordinate curves through the interval from 0 to 360 degrees, and incremented the radius by a fixed amount between sweeps. The result was similar to the design in Figure 3, and seemed more aesthetic than the patterns based on a single angular sweep.

Woodrow's program was written for the Hewlett-Packard 9825B desktop computer, which uses a language (HPL) that is somewhat different from standard Basic. I transcribed his algorithm into Tektronix 4052 Basic and used it to generate designs of the type shown in Figures 3 and 4.

Woodrow's algorithm used the polar coordinate function R = B*(1-SIN(L*A)), where L is a constant selected by the user, and B is increased for each successive angular sweep. Curves of this type, which incorporate trigonometric functions, display a high degree of angular symmetry and consist of lobes that look somewhat like flower petals (as in Figure 4).

Traditionally, small integral values of L are used; L = 3 in Figure 3 and L = 8 in Figure 4. It was generally assumed that increasing L would just increase the number of petals in the daisy-like design. This is what would be expected on purely mathematical grounds.

After a short while I stopped using this algorithm, because the variety of different pictures that could be made still seemed very limited. It sat in a tape file for a couple of years before I realized that I could, after all, create some unusual effects by using larger values of L.

This is the case because computer science is a bit different from pure

Were you made for each other? Are the two of you destined for romance? Spend an evening with LOVERS OR STRANGERS, and find out. LOVERS OR STRANGERS can tell how compatible you are in love, sex, money, work, play and more. It's fun...it's serious...it's romantic...it's thought-provoking...it will keep you up nights.

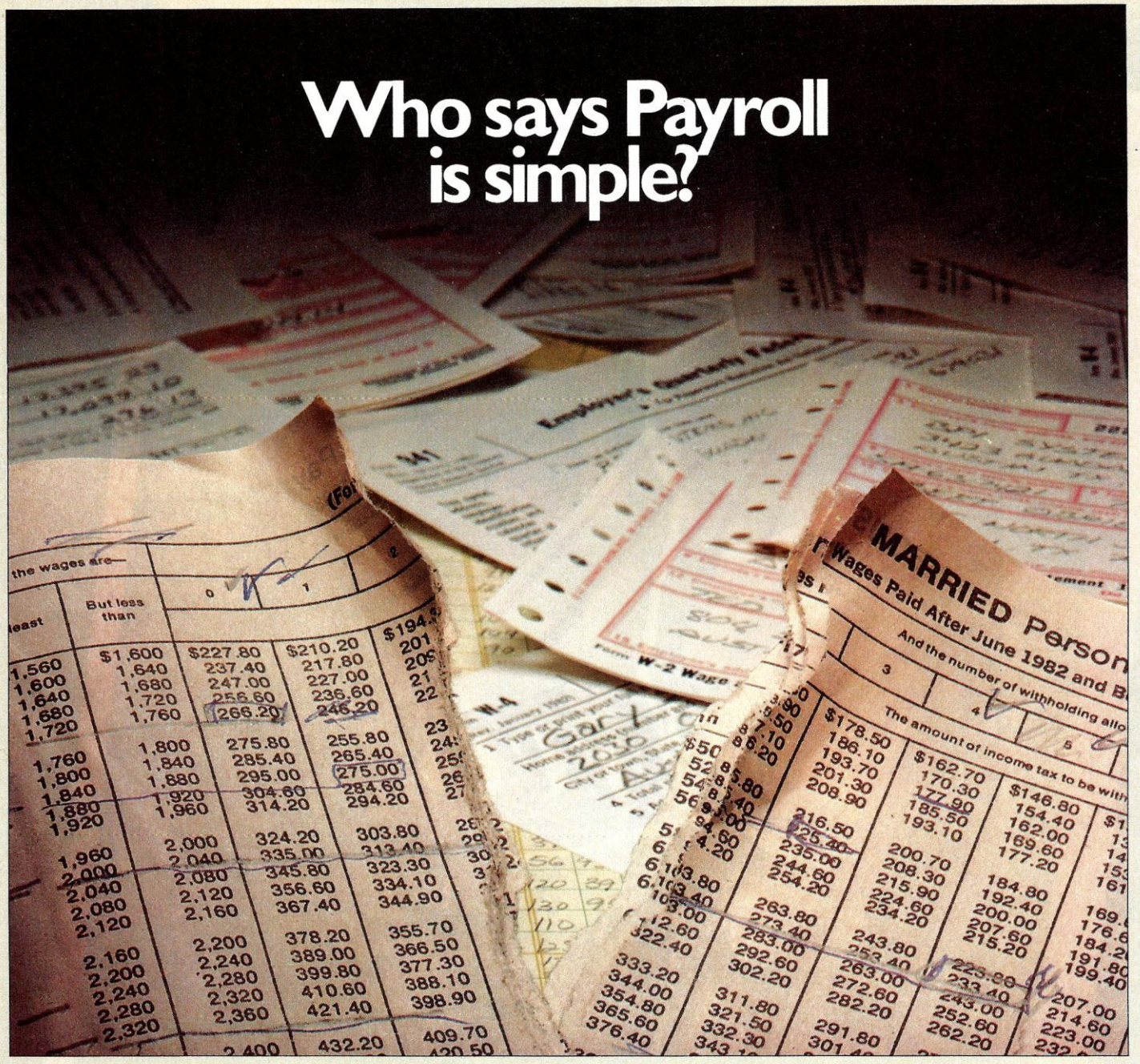
LOVERS OR STRANGERS is available at your local dealer or direct from
Alpine Software, 2120-E Academy Circle, Colorado Springs, CO 80909 (303) 591-9874

Only $ 29.95. Add $1.00 for shipping/handling. VISA, Mastercard, checks, COD accepted.
Colorado residents add 3% sales tax. Requires Apple II Plus, 48K, DOS 3.3, and a willing partner.

Apple II Plus is a registered trademark of Apple Computers, Inc.

CIRCLE 109 ON READER SERVICE CARD

Who says Payroll is simple?



We do. There is simply no other Payroll Accounting system this complete available for microcomputers. The BPI Payroll System performs all the standard payroll functions. It contains tax tables for FICA, federal and all 50 states plus Puerto Rico and the District of Columbia, as well as cities and counties with uniform methods of taxation. And our Update Service keeps your Payroll System current with all tax law changes affecting you.

Companies with as few as four or as many as several hundred employees in different states or branch offices can simplify their payroll accounting dramatically with the BPI Payroll System. It provides for expense reimbursement, automatic calculation of net pay, and wage distribution. It also produces W-2's, payroll checks and other important payroll reports.

With the BPI Payroll System, employees may be paid weekly, biweekly, semimonthly or monthly by three methods: salary, hourly with up to three different hourly rates, and commission. The system also provides for income from tips.

Deductions from FICA, federal and state taxes are built in, and you can easily set up as many as six other deductions for your employees.

All BPI Systems software is designed to match the growth of your company:

- General Ledger
- Accounts Receivable
- Accounts Payable
- Inventory Control
- Job Cost
- Time Accounting

The Payroll System interfaces with the General Ledger and Job Cost Systems as well.

Payroll Accounting is simple if your software is powerful enough. Ask for a demonstration by your computer dealer or write us for more information. You'll see how simple Payroll Accounting can be.

BPI SYSTEMS™

SIMPLY, THE MOST POWERFUL SOFTWARE IN BUSINESS.

3423 GUADALUPE / AUSTIN, TX 78705 / 512-454-2801

BPI and BPI Systems are trademarks of BPI Systems Inc.

CIRCLE 120 ON READER SERVICE CARD

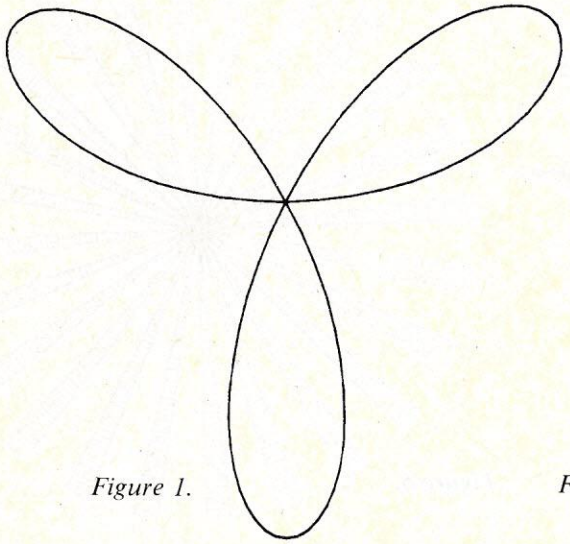


Figure 1.

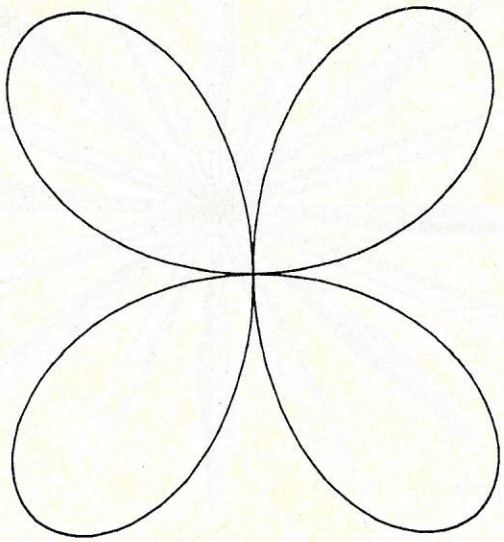


Figure 2.

mathematics. In particular, computers use finite increments and intervals. If the increment in the angle A were made smaller and smaller as higher values of L were tried, a simple daisy pattern would indeed result.

But if the increment in A was fixed at some reasonably large value, such as 5 degrees, only selected points on the daisy pattern would be computed; when these points were connected by straight line segments through use of vector graphics routines, new and novel patterns could be created. In fact, successive computed points could jump around on the background daisy pattern in a rather wild fashion.

A sample pattern is shown in Figure 5. This design was made using L = 16 in Woodrow Europa's algorithm. The angular increment was 5 degrees.

I then generalized Woodrow's algorithm in two ways. First, I incorporated five additional, carefully chosen polar coordinate functions, which are embedded in subroutines and selectable by inputting a value for the parameter N from the keyboard.

Second, I made provision for inputting the amount (D) by which the radius B is increased for successive angular sweeps; and the amount (G) by which the angle A is incremented during an angular sweep.

In addition, I installed an option, selectable through the parameter T1, that enables the user to get a list of the values of parameters N, L, D, and G at the bottom of the picture. In this way a pleasing design can readily be re-created at a future date without straining one's memory.

I call the resulting program Sinusoidal Loop Program No. 1, and it can be used to create a large number of varied and striking patterns. Some of these are reproduced here (Figures 6-10).

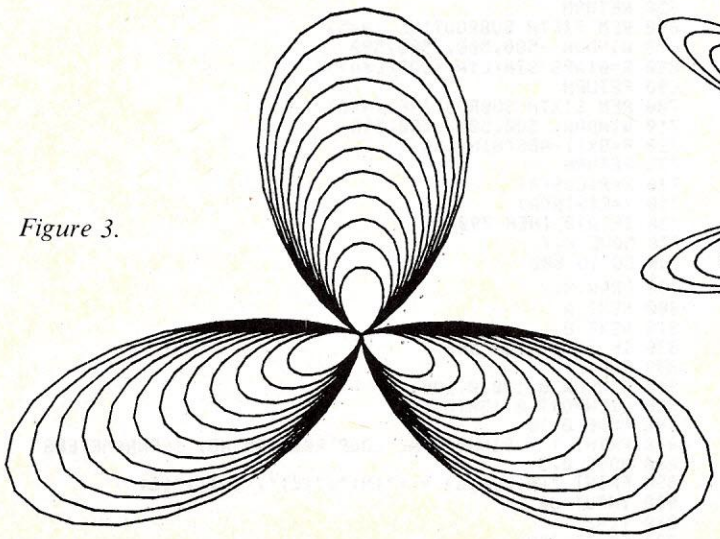
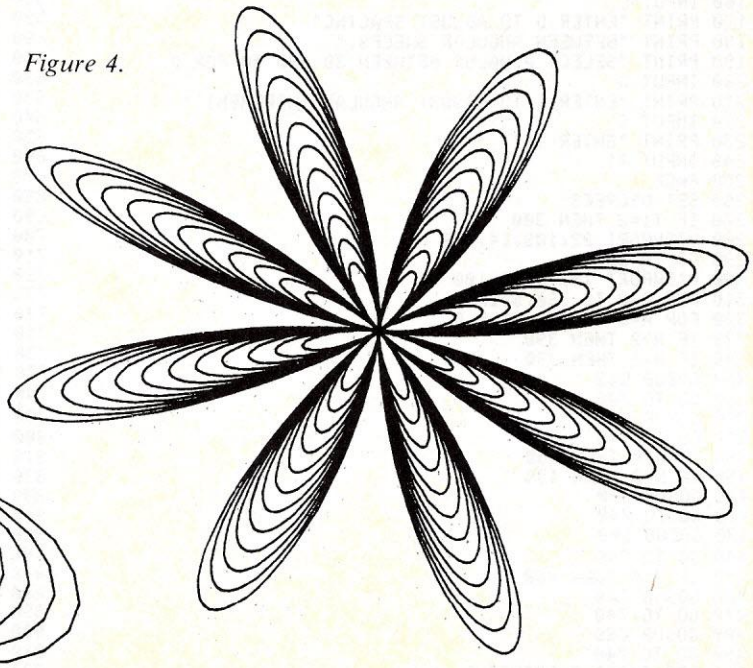


Figure 3.

Figure 4.



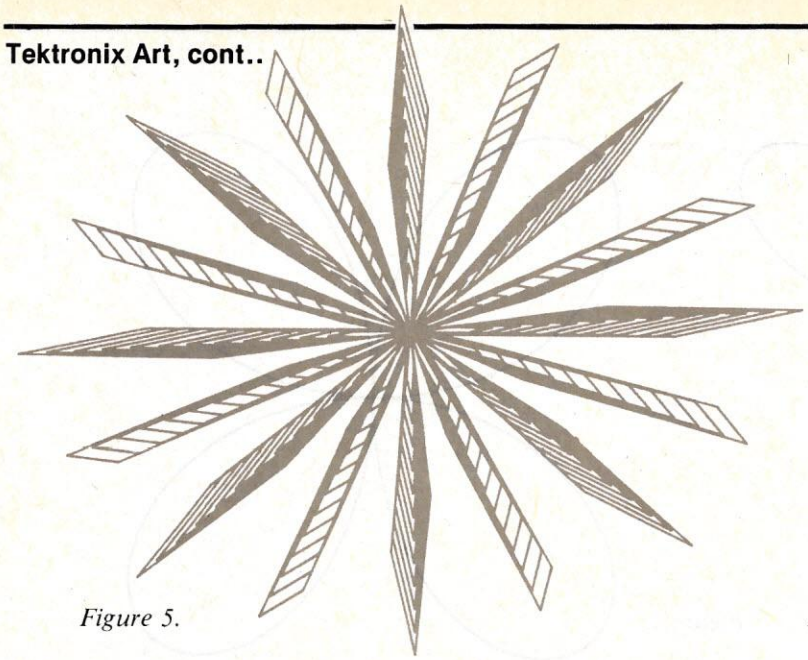


Figure 5.

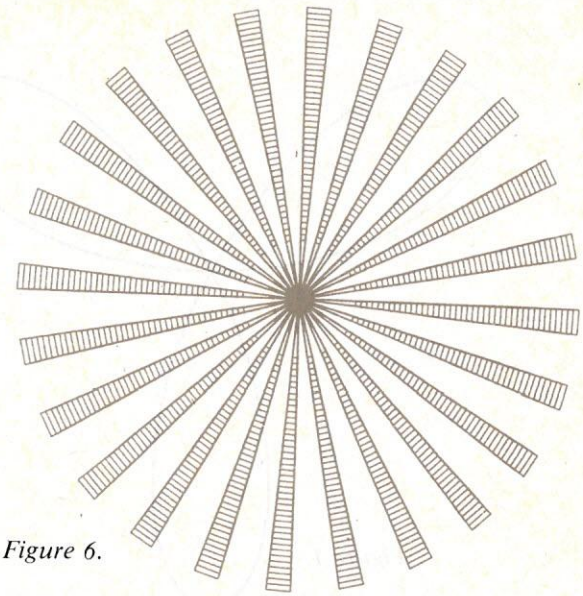


Figure 6.

The Program

The program is easy to use. It prompts the user to enter values for N, L, D, and G from the keyboard. When it asks for a value for T1, enter a 1. The picture will then be plotted (it takes 10 to 20 seconds on a Tektronix 4052) and the parameter values listed at the bottom.

Then press the HOME/PAGE button to clear the screen and hit the RETURN key; the picture will be plotted again, but this time without the parameter values. (Alternatively, if you don't want a parameter value list at all, enter a 2 when the program asks for T1, and you will get a "clean" plot the first time.) Type RUN to execute the program again for the next picture.

Table I lists the ranges of input parameter values that I have found to give good results with this program. However, some values outside these intervals could conceivably make good pictures too. The patterns tend to repeat for L values larger than about 60 (with G = 5 degrees). The parameter values don't have to be integers; I have had good results with decimal fractions like L = 17.2 and L = 29.2.

In fact, if you change the L value by as little as ± 0.1, you may get an entirely different picture. This, again, is something that was not realized

```
100 REM SINUSOIDAL LOOP PROGRAM NO. 1
110 PAGE
120 PRINT "ENTER N TO SELECT SUBROUTINE."
130 PRINT "N MUST BE 1,2,3,4,5 OR 6."
140 INPUT N
150 PRINT "ENTER L TO GENERATE A PARTICULAR PICTURE."
160 INPUT L
170 PRINT "ENTER D TO ADJUST SPACING"
180 PRINT "BETWEEN ANGULAR SWEEPS."
190 PRINT "SELECT A VALUE BETWEEN 30 AND 50 FOR D."
200 INPUT D
210 PRINT "ENTER G TO ADJUST ANGULAR INCREMENT."
220 INPUT G
230 PRINT "ENTER T1"
240 INPUT T1
250 PAGE
260 SET DEGREES
270 IF T1=2 THEN 300
280 VIEWPORT 22,108,14,100
290 GO TO 310
300 VIEWPORT 15,115,0,100
310 FOR B=0 TO 360 STEP D
320 FOR A=0 TO 360 STEP G
330 IF N>2 THEN 390
340 IF N=1 THEN 370
350 GOSUB 540
360 GO TO 740
370 GOSUB 500
380 GO TO 740
390 IF N>4 THEN 450
400 IF N=3 THEN 430
410 GOSUB 620
420 GO TO 740
430 GOSUB 580
440 GO TO 740
450 IF N=5 THEN 480
460 GOSUB 700
470 GO TO 740
480 GOSUB 660
490 GO TO 740
500 REM FIRST SUBROUTINE (N=1)
510 WINDOW -500,500,-500,500
520 R=B*(SIN(L*A)+COS(L*A))
530 RETURN
540 REM SECOND SUBROUTINE (N=2)
550 WINDOW -750,750,-750,750
560 R=B*(COS(L*A)-ABS(SIN(L*A)))
570 RETURN
580 REM THIRD SUBROUTINE (N=3)
590 WINDOW -500,500,-500,500
600 R=B*ABS(SIN(L*A))
610 RETURN
620 REM FOURTH SUBROUTINE (N=4)
630 WINDOW -1000,1000,-1000,1000
640 R=B*(1-SIN(L*A))
650 RETURN
660 REM FIFTH SUBROUTINE (N=5)
670 WINDOW -500,500,-500,500
680 R=B*ABS(SIN(L*A)+COS(L*A))
690 RETURN
700 REM SIXTH SUBROUTINE (N=6)
710 WINDOW -500,500,-500,500
720 R=B*(1-ABS(SIN(L*A)))
730 RETURN
740 X=R*COS(A)
750 Y=R*SIN(A)
760 IF A>0 THEN 790
770 MOVE X,Y
780 GO TO 800
790 DRAW X,Y
800 NEXT A
810 NEXT B
820 IF T1=1 THEN 840
830 END
840 WINDOW 0.130,0,100
850 VIEWPORT 0,130,0,100
860 MOVE 0,10
870 PRINT "   SINUSOIDAL LOOP PROGRAM NO. 1 PARAMETERS"
880 MOVE 0,5
890 PRINT "(N,L,D,G) = (";N;",";L;",";D;",";G;")"
900 INPUT J$
910 T1=2
920 GO TO 250
```

LAST NIGHT WE EXCHANGED LETTERS WITH MOM, THEN HAD A PARTY FOR ELEVEN PEOPLE IN NINE DIFFERENT STATES AND ONLY HAD TO WASH ONE GLASS...

That's CompuServe, The Personal Communications Network For Every Computer Owner

And it doesn't matter what kind of computer you own. You'll use CompuServe's Electronic Mail system (we call it Email™) to compose, edit and send letters to friends or business associates. The system delivers any number of messages to other users anywhere in North America.

CompuServe's multi-channel CB simulator brings distant friends together and gets new friendships started. You can even use a scrambler if you have a secret you don't want to share. Special interest groups meet regularly to trade information on hardware, software and hobbies from photography to cooking and you can sell, swap and post personal notices on the bulletin board.

There's all this and much more on the CompuServe Information Service. All you need is a computer, a modem, and CompuServe. CompuServe connects with almost any type or brand of personal computer or terminal and many communicating word processors. To receive an illustrated guide to CompuServe and learn how you can subscribe, contact or call:

CompuServe

Information Service Division, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220

800-848-8990
In Ohio call 614-457-8650

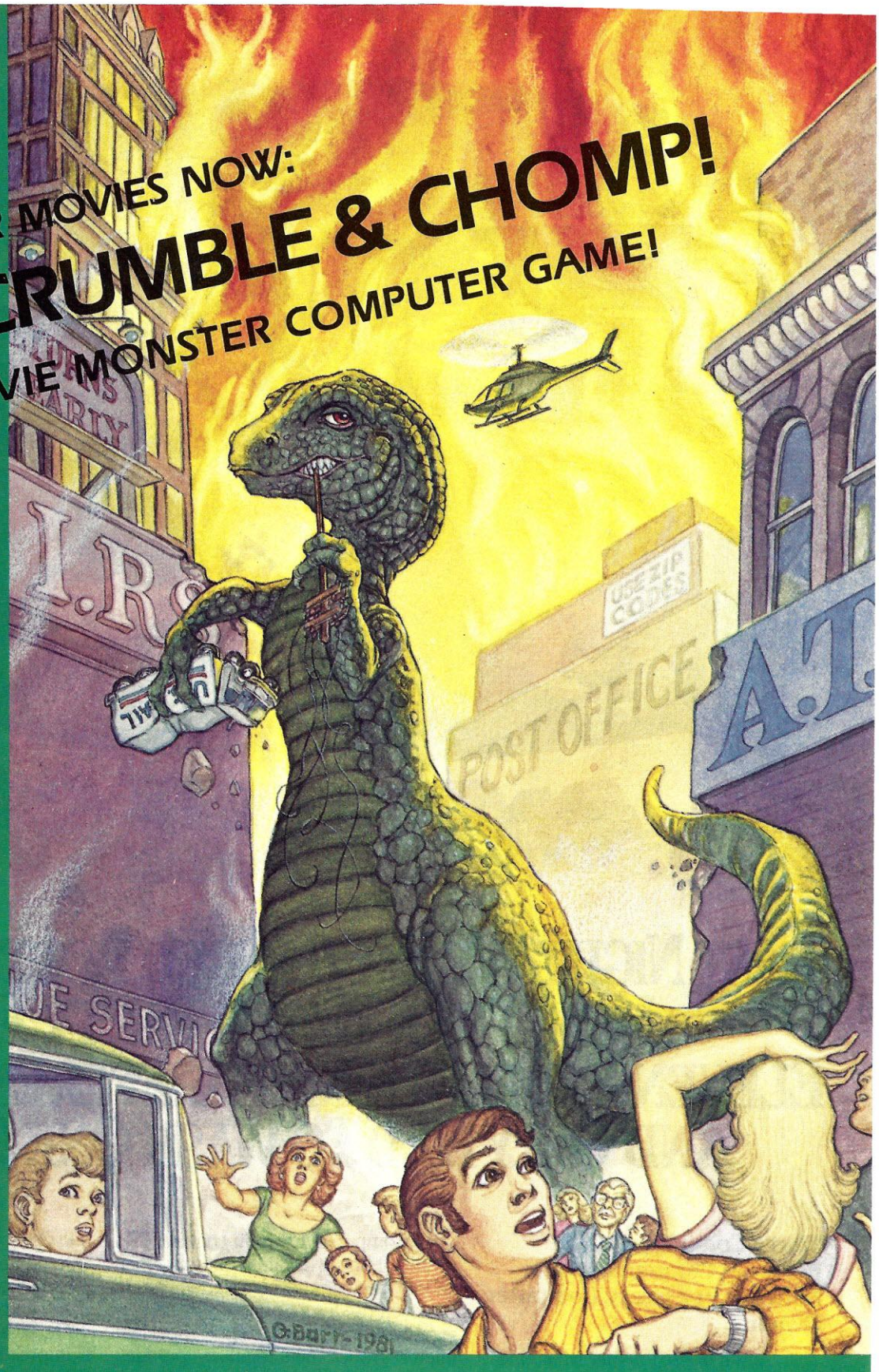
An H&R Block Company

CIRCLE 136 ON READER SERVICE CARD

FIRST: MONSTER MOVIES NOW:

CRUSH, CRUMBLE & CHOMP!

THE GREAT MOVIE MONSTER COMPUTER GAME!



And guess who stars as the movie monster. You! As any of six different monsters. More if you have the disk version.

You can terrorize and destroy four of the world's largest and most densely populated cities in over 100 possible scenarios. From Tokyo to the Golden Gate, you are the deadliest creature in the air, on the land, or in the sea.

You can be the deadly amphibian who simultaneously smashes street cars, lunches on helpless humans and radiates a ray of death.

If you were a giant winged creature, think of the aerial attacks you could make on the terrified but tasty tidbits beneath you.

But as in all the best monster movies, you're up against everything the human race can throw at you—even nuclear warheads and a strange concoction developed by a team of mad scientists.

For only $29.95 you get 6 stupendous monsters, each with its own monstrous summary card, 4 teeming metropoli displayed in graphic detail on your computer display and mapped in the accompanying 48-page illustrated book, the awesome sounds of monsterly mayhem, and spine-tingling, real-time, edge-of-your-seat excitement.

GET CRUSH, CRUMBLE & CHOMP
now at your local dealer for your APPLE, ATARI, or TRS-80 . . **before it's too late.**

COMPUTER GAMES THINKERS PLAY

EPYX

CIRCLE 198 ON READER SERVICE CARD

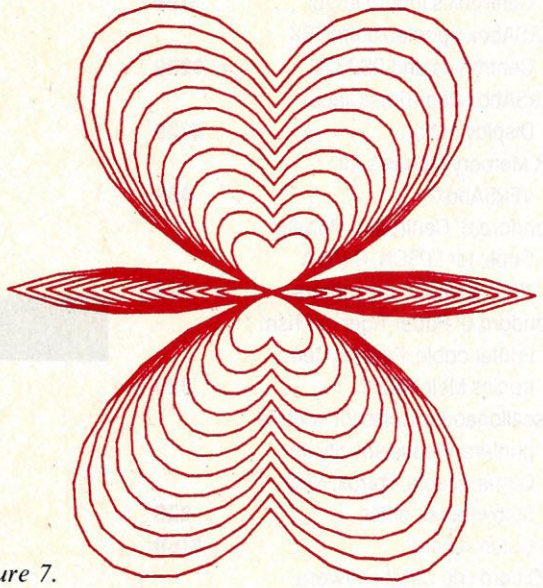


Figure 7.

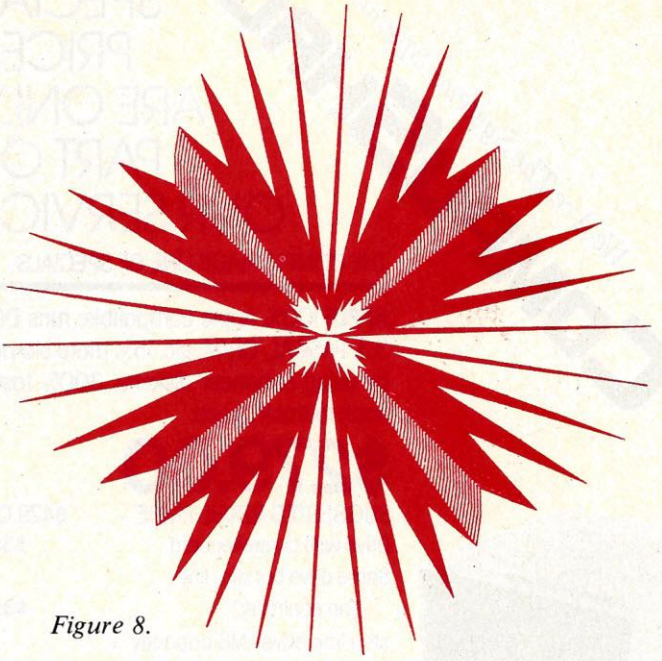


Figure 8.

Table I. Suggested Parameter Values.

Parameter	Range of Values	
	From	To
N*	1	6
L	6	60
D	30	50
G	5	15
T1**	1	2

*N must be 1,2,3,4,5, or 6.
**T1 must be 1 or 2.

historically. Similarly, small changes in the angular increment, G, can have a big effect.

Sinusoidal Loop Program No. 1 is the first of several recent computer programs I have written using polar coordinate functions; some of the others are further generalizations of Woodrow Europa's algorithm and some are completely new. They will all appear in *Creative Computing* over the next few months.

In order to use these programs you will need access to a Tektronix 4050 series terminal, which is used here as a stand-alone microcomputer, or some other system having extremely high CRT screen resolution. (Unfortunately, the vast majority of home computers do not have the necessary screen resolution. However, if you have a good mechanical X-Y plotter, that will do nicely.)

The programs generally take up about 6K of memory and use vector graphics. They are written in Basic, but the graphics commands (MOVE, DRAW, WINDOW, and VIEWPOINT) are machine specific. You will have to adapt the programs to your own graphics system.

Even if you don't have access to a suitable computer, I hope you will find the algorithms interesting (a complete source listing will accompany each article) and that you enjoy the sample output designs that will be reproduced with each listing. □

Figure 9.

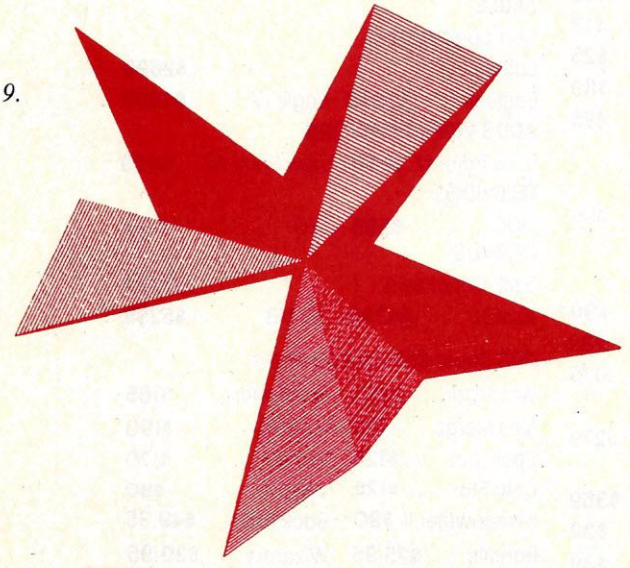
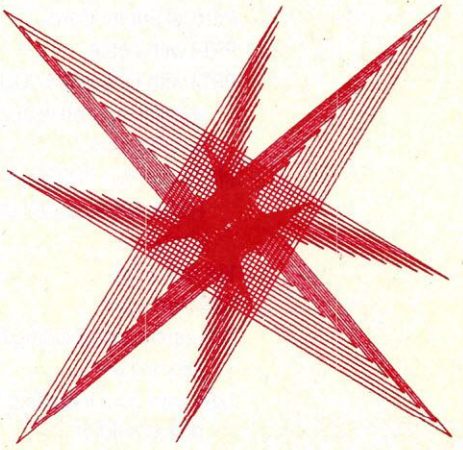


Figure 10.



We Are The Systems Specialist

CompuSHACK

SPECIAL PRICES ARE ONLY PART OF OUR SERVICE

THE COMPUSHACK LINE OF SPECIALS

APPLE 100% Apple compatible; runs DOS 3.3, PASCAL, CP/M, etc. 15% more storage by using enhancer diskette. 300% faster track-to-track speed.

$279.00

SUGGESTED RETAIL PRICE $429.00

Drive with controller card **$359**
Same drive but slim line (no controller) **$399**
slim line drive 1 MB capacity + controller **$999**

APPLE II+ Complete System: **APPLE II+** Computer, disk drive and controller, 12" monitor, green screen **$1599**

APPLE II+ compatible Winchester drives 5 MB. . . . **$1795** 10 MB. . . . **$1995** Includes controller, cables, software for CP/M, DOS or **PASCAL.**

8" drive, controller, power supply, cables, cabinet and software . . . **$1595**

APPLE II plus 64K, Z80 card, 80 column card, controller hardware diagnostic, DOS 3.3, disk drive 163K, green monitor—runs DOS 3.3, CP/M and PASCAL **$1950**

CompuSHACK apple®

OTHER PRODUCTS FOR APPLE II

VERSAcard-multifunction board. . . . **$169**
BSR Transducer. **$19**
Applications/Demo Disk **$25**
Parallel Printer Card. **$69**
PRT-1 with cable **$75**
PRT-1 with EPSON 80/100 screen graphics dump with cable-Graffitti card **$99**
PRT-1 with NEC 8023 or C.ITOH PROWRITER screen Dump Graphics **$99**
16K ram card **$89**
32K ram card **$175**
64K ram card including DOS 3.3 disk emulator. **$279**
128K ram card including DOS 3.3 disk emulator **$369**
PASCAL disk emulator **$39**
DOS 3.3 disk emulator **$39**
GRAPPLER INTERFACE CARD . . . **$139.00**
Visicalc Expand Program **$59**
VERSAbox Spooler/buffer 16K Centronics Input/Output **$199**
VERSAbox Spooler/buffer 16K Centronics and RS232C **$239**
VERSAbox Real Time Clock/ Display option. **$129**
16K Memory Modules for VERSAbox **$39**
Standard 6' Centronics Parallel Cable for EPSON, C-ITOH, NEC, ANADEX, and others **$22**
Standard 6' Paper Tiger or Prism Printer cable, Parallel Centronics Male DB25. . . . . **$26**
Miscellaneous cables for various printers. Please specify for Qume, Diable, Votrax, NEC Spinwriter or other **$26**
80 Column card **$169**
Z80 card (no CP/M software included) **$149**
Controller for Apple II including hardware diagnostics **$115**

FRANKLIN ACE 1000 COMPUTER— Complete System Franklin Ace 1000, Apple compatible, 64K, Upper and Lower case Typewriter style keyboard, 12-Key numeric pad, Alpha lock keys, Visicalc keys, 50 watt power supply and a built in fan. **$1599.00**

CompuSHACK FRANKLIN

OSBORNE COMPUTER SYSTEM— includes CRT, 64K, Dual floppy disks, RS-232 port, IEEE-488 interface, Wordstar, Mailmerge, Supercalc, Mbasic and CP/M. **$1795.00**

ALTOS
Computer 8000-15 . . . . . **$3999**

EAGLE
Computer System
Eagle II. **$2699**
Eagle III . . . **$3333** Eagle IV . . . **$4999**

ADDS VIDEO MONITORS
View Point A1 **$560** View Point A2. . . **$499**

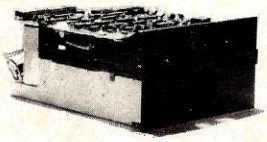
TELEVIDEO
910C . . . . . **$599** 912C **$759**

CORVUS
5 MB Winchester. **$2999**
10 MB. . . . **$4399** 20 MB **$5299**

PDS Super Software Specials

Word Star. . .	**$220**	DB Master. . . .	**$165**
Mail Merge . .	**$75**	Visicalc	**$190**
Spell Star . . .	**$125**	Visiplot	**$170**
Calc Star . . .	**$125**	Visiterm	**$90**
Screenwriter II	**$90**	Back It Up. . .	**$49.95**
Bandits . . .	**$25.95**	Wizardry . . .	**$39.95**

Inventory Management Synergistic. . . **$100**



DISK DRIVES

TANDON FLOPPY DISK DRIVES

TM 100-1 SS/DD $189.00
TM 100-2 DS/DD $249.00
TM 100-4 96 TPI DS/DD $379.00
HARD DISK SYSTEMS including all software and cables.
DAVONG OR CORONA 5 MB. . . $1795.00
10 MB $1995.00

SHUGART:

SA 400 . . . . . $215 SA 800/801. . . $379
SA 450 . . . . . $281 SA 850/851. . . $535

SIEMENS:

FDD 100-5 . . . $189 FDD 100-8. . . $349
FDD 200-5 . . . $259 FDD 200-8 . . . $449

QUME:

DT-5. . . . . $279 DT-8 . . . . . $469

TEAC:

FD50A . . . . . $189 FD55A $199
FD50B . . . . . $269 FD55B $279
FD50E . . . . . $269 FD55E $279
FD50F . . . . . $389 FD55F $399

MONITORS & PRINTERS

BMC 12" green $89
BMC 12" green (high res.) $149
BMC 13" color monitor $289
C.ITOH Prowriter parallel $499
C.ITOH Prowriter serial $599
C.ITOH Prowriter 15" carriage...Parallel $699
F10 Daisywheel letter quality $1395
MANNESMANN TALLY MT 160 microcomputer printer. Dot Matrix printer, 160 CPS, Compact, Cost Effective, Built-in graphics. **Save $200** . . $799.00

OKIDATA

82A . . . . . $459 83A $730
84AP . . . . . $999 84AS $1099

EPSON

MX-80 FT . . . $525 MX-80 . . . . $469
MX-100. . . . $699

AMDEK VIDEO MONITORS

Video-100 . . . $95 Color II $675
Video-300. . . $169 Color III $420
Color I $345

NEC

12" green screen $169
RGB Color Monitor $959
Spinwriter 3510 . . . . . $1799
NEC Letter quality printer 7715 . . . $2399
PC 8001 . . . Call PC 8031A . . . Call
PC 8012A . . . Call PC 8023A . . . $479
PC 8033A . . Call

CABINETS/POWER SUPPLY

Dual 8" disk drive cabinet/ps. $249
Dual 5¼" disk drive cabinet/ps . . . $99
Single 5¼" disk drive cabinet/ps. . . $69
2 single side double density 8" disk drives, cabinet/power supply. $895

CompuShack
brother

BROTHER Model HR-1 16 CPS, Daisywheel, letter quality, bidirectional printer
. . . . . $769.00

CompuShack
SCM

SMITH CORONA TP-1 12 CPS, 10 or 12 CPI, Unidirectional Letter quality printer
. . . . . $569.00

CompuShack
NEC

SPECIALS OF THE MONTH IBM PC— COMPLETE LINE

CompuShack
IBM

IBM PC Complete System: includes 64K IBM-PC with 2 Floppy Disk Drives, Floppy Drive Controller, 12" monitor, Color Graphics card. All for only . . . $2899.00
AST CARD 512K memory board for IBM-PC—512K ram, Clock/Calendar, Serial Port, Parallel Port.
64K. . . $620.00 512K. . . $1199.00
AST I/O Interface card with Clock/Calendar I Parallel Port and 2 Serial Ports . $249.00
AST COMBO CARD 256K ram, Parallel Port, Serial Port, Clock Calendar and Battery back-up . $599.00

MAYNARD ELECTRONICS PRODUCTS

Floppy Disk Controller. $179.00
Floppy Disk Controller w/Parallel Port. $229.00
Floppy Disk Controller w/Serial Port. $239.00
Memory Card w/256K ram $499.00

PDS UNIVERSAL MEMORY CARD

A unique memory card with 256K ram, Game Port and Serial Port. . . $499.00

HERCULES GRAPHICS CARD

This card gives you 720 x 350 graphics capabilities and it is completely compatible with DOS software for only $489.00
BIG BLUE—Dual I/O ports, dual processing, Serial port, Parallel port, 5 MHZ Z-80 B, 64K, Hard disk interface, Clock/Calendar, let's you run existing CP/M software.
List $589.00 . . . . . Ours $479.00

WE'RE OPENING RETAIL STORES THROUGHOUT THE U.S.A. SOON!

FRANCHISE INQUIRIES WELCOME

Prices subject to change without notice
ALL FLOPPIES REPAIRED QUICKLY AT LOW COST

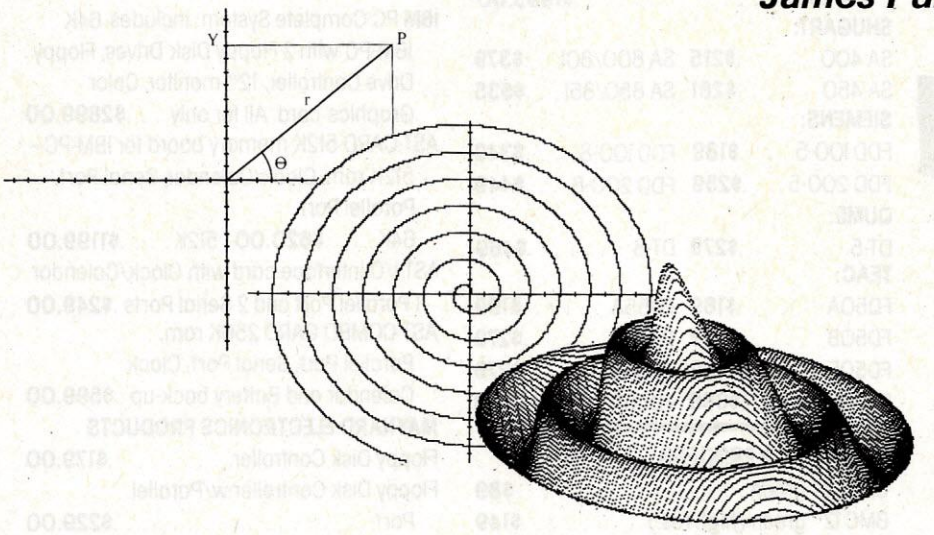
Sales and Service:
(714) 730-7207
Headquarters
Telex: 18-3511
Answer Back CSMA

CompuShack
2630-H Walnut Avenue Tustin, CA 92680
Business Home Computers

CIRCLE 137 ON READER SERVICE CARD

Three Ways of Looking At A Function

James Fuller



Anyone with scientific or technical interests needs to have an intuitive feeling for the behavior of different kinds of mathematical functions, and the typical shapes of their plots. This is one of the barriers which keep many people from an enjoyment of science, preventing them from taking pleasure in what is, when you think about it, the art of our time.

It used to be that the only way to acquire such an easy familiarity was to sit down with a pencil and graph paper, heave a sigh, and start plotting points.

Even with a calculator this is slave labor. So while most people (the ones who paid attention in high school, anyway) can recognize simple linear, exponential, and quadratic plots and the garden-variety trigonometric functions, if they encounter an unlovely object such as

$$f(X) = \cos(4X) + (20/(X^2 + 3))$$

it's back to graph paper.

For anyone with a personal computer, however, this is no longer true. The computer will take over the dull, repetitive task of plotting points, and the user is free to pay attention only to what the function actually does. He is also encouraged to experiment with the effects of making minor or major changes in the formula, and to plot it in different coordinate systems.

The Applesoft Basic program in Listing 1 can create three kinds of high-resolution plot of a given function. It can plot points in Cartesian or polar coordinates, or it can create a solid of revolution in three simulated dimensions.

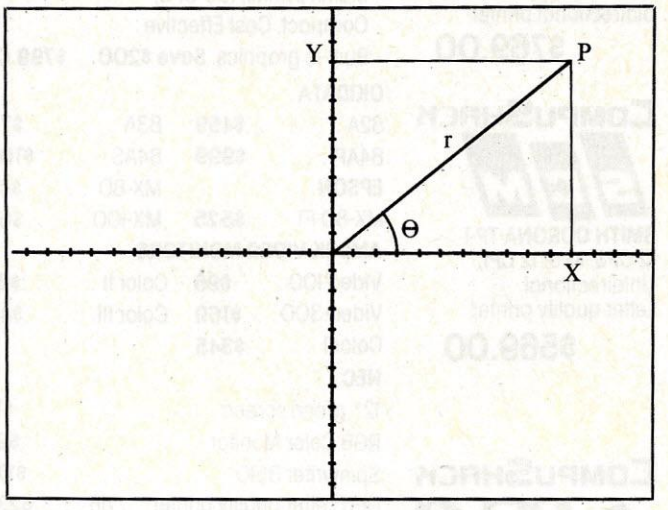
Cartesian coordinates need no introduction and little discussion. They are used daily to plot everything from the third world birthrate to the speed with which Brand X aspirin enters the bloodstream.

When Descartes warped the future of Western thought by inventing the graph, this is what he invented. In this system a point is uniquely located in two dimensions by giving its coordinates on a horizontal and a vertical axis.

James P. H. Fuller, 2075 S. Lumpkin St., Athens, GA 30606.

There is another way to locate a point uniquely in a plane, though this method is not in such common use. In the polar coordinate system we draw a line between the point of origin of the system and some other point of interest, and specify where that point is by giving its distance from the origin and the angle the line forms with the horizontal axis. Thus point p in Figure 1 can be located either by giving values for X and Y or by giving length r

Figure 1.



and angle θ (theta). The translation between the two systems involves the elementary trigonometric relations

$$\sin\theta = Y/r \quad \text{and} \quad \cos\theta = X/r$$

or, rearranged,

$$X = r(\cos\theta) \quad \text{and} \quad Y = r(\sin\theta)$$

Polar coordinates are especially appropriate for graphing periodic functions such as sines and cosines. Complex combinations of simple periodic functions can result in

some remarkably beautiful plots. Figure 2 is the polar plot of

$$f(X) = \cos (7 * \sin (2x))$$

A solid of revolution is created by rotating a two-dimensional figure about an axis to create a three-dimensional surface. A circle rotated about a line passing

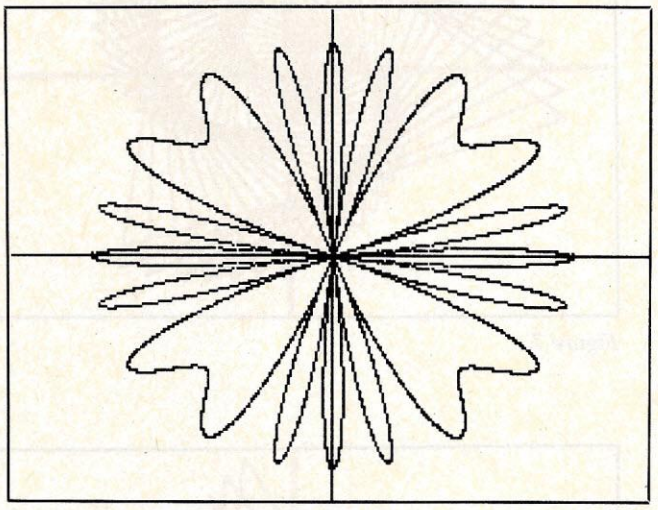


Figure 2.

through its center creates a sphere, a right triangle rotated about one of its legs creates a cone, and so forth.

The program presented here takes a function plotted in Cartesian coordinates and creates a solid of revolution by rotating it about the Y-axis. The program then displays the result on the screen in a way that gives a convincing illusion of a three-dimensional object. The viewer seems to be looking at it from above and somewhat to one side. Portions which he would not be able to see from this vantage point are eliminated.

Running The Program

To run the program, the user must first translate the function he wants to examine into Basic and type it into line 170:

```
170 DEF FN R(Q) = (user's formula, in terms of Q)
```

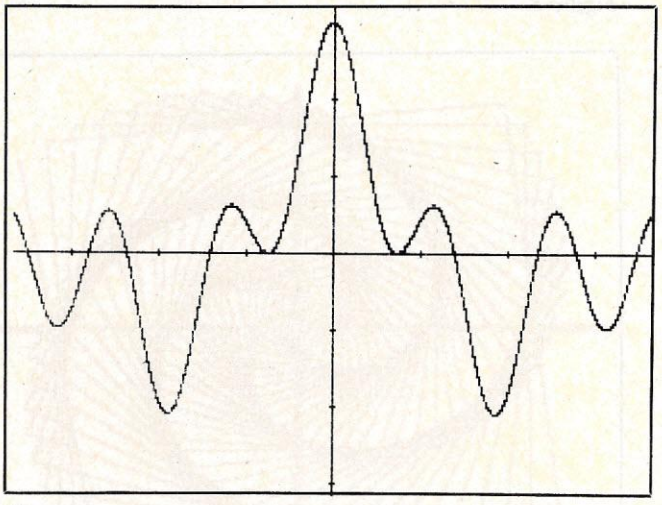


Figure 3.

The plotting routines can call it from this point whenever it is needed.

After the equation is entered and the program is started, a self-explanatory series of prompts appears, asking the user to choose a Cartesian, polar, or three-dimensional plot. If one of the first two is chosen, further questions appear asking about the function increment (how much distance between plotted points), whether the axes should be expanded or compressed, and whether the origin should be moved.

It is worth mentioning that whole number increments are not always best. For example, the function f(X) = 1/(X-5) will give a divide-by-zero error where X = 5 if increment 1 is chosen. If increment 1.1 is chosen instead, X never lands precisely on 5 and the error is avoided.

Other prompts appear if the user asks for a three-dimensional plot. These plots have a habit of running off the top or bottom of the screen. If the user finds this is happening, he can enter a value which moves the plot up or down the screen, and another which expands or compresses it in the vertical direction.

Once all the questions are answered, the program assumes control and produces the desired plot in accordance with the instructions the user has given it.

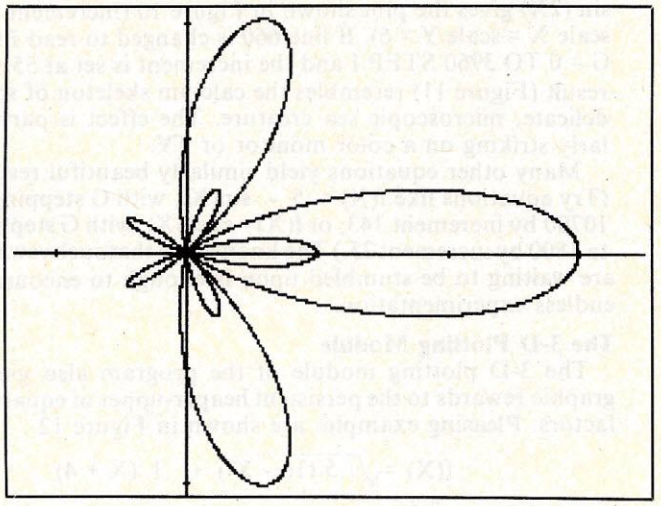


Figure 4.

Figures 3, 4, and 5 show the three types of plots the program can create of the function

$$f(X) = \cos(X) + \cos(2X) + \cos(5X).$$

Altering The Program

The program has another use besides examining the graphs of complicated equations. It can also create some very elegant graphics, which may be appreciated for their own sake. The slight alterations

```
690 FOR G = 0 to 36000 STEP I
    DEL 750, 760
770 IF G = 0 THEN HPLOT XX, YY
775 HPLOT TO XX, YY
```

will cause the computer to draw a line between each two consecutive points plotted in polar coordinates. This will have little effect if the points are close together (that is, if the function increment is small.) On the other hand, large increments often produce remarkable results. With an increment of 1, the function $f(X)=X/\pi$ (one version of Archimedes' spiral) produces the plot shown in Figure 6. The plots in Figures 7, 8, and 9 were produced by increments of 122, 145, and 88.5 respectively.

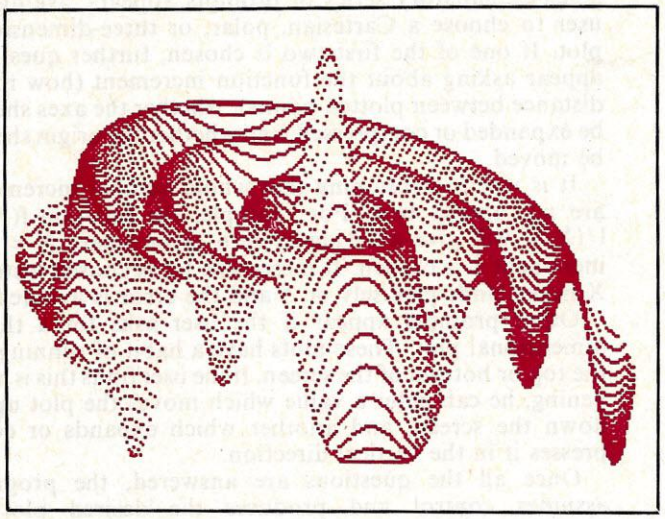


Figure 5.

As the program is printed here, the equation f(X)= .25 - sin (2X) gives the plot shown in Figure 10 (increment = 1, scale X = scale Y = 6). If line 660 is changed to read FOR G = 0 TO 3960 STEP I and the increment is set at 55, the result (Figure 11) resembles the calcium skeleton of some delicate, microscopic sea creature. The effect is particularly striking on a color monitor or TV.

Many other equations yield similarly beautiful results. (Try equations like f(X) = .5 - sin(X), with G stepping to 10700 by increment 143, or f(X) = cos(4X), with G stepping to 1800 by increment 25.) The knowledge that such rewards are waiting to be stumbled upon is enough to encourage endless experimentation.

The 3-D Plotting Module

The 3-D plotting module of the program also yields graphic rewards to the persistent heaper-upper of equation factors. Pleasing examples are shown in Figure 12

$$f(X) = \sqrt{|.5\ (16 - X^2)|} + 1/(X + 4)$$

and Figure 13

$$f(X) = \cos(4X) + (20/(X^2 + 3))$$

— the ugly-duckling equation with which we began.

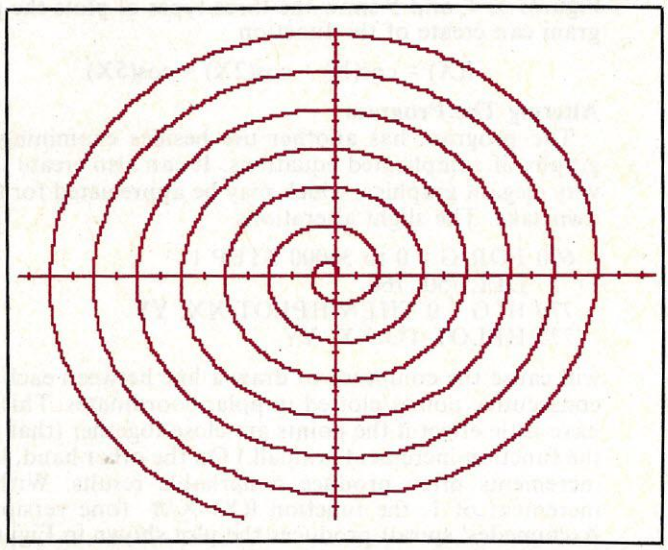


Figure 6.

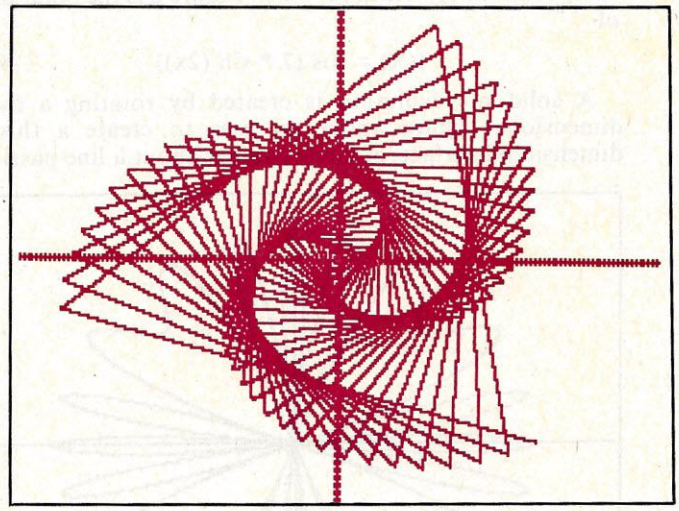


Figure 7.

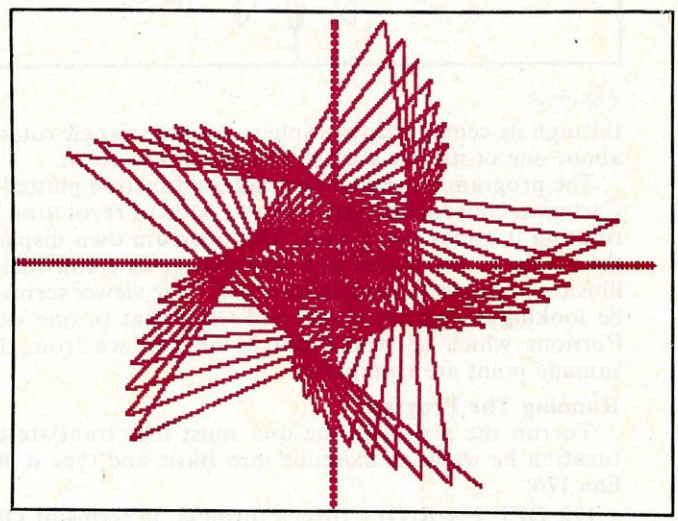


Figure 8.

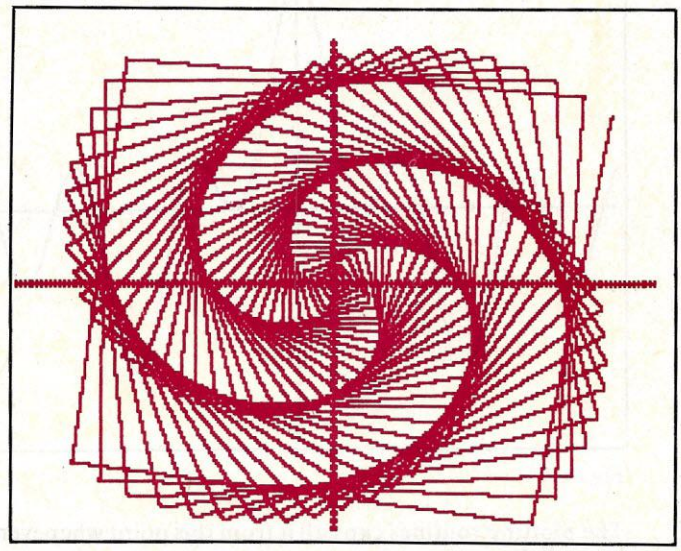


Figure 9.

January 1983 © Creative Computing

BE CHALLENGED

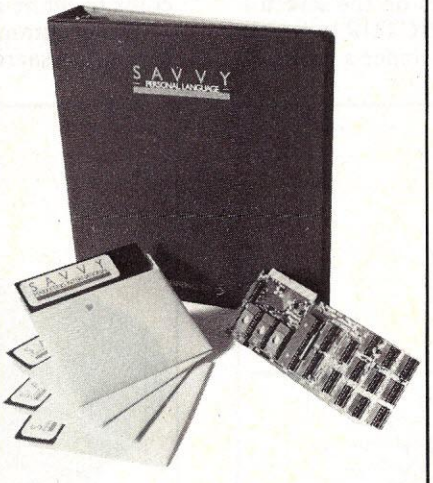
If you are a talented micro computer specialist, you follow the field closely, you know what's been done and what's expected. —

But you've never seen anything like

SAVVY™

Nobody has.

- A CO-PROCESSOR for the Apple II, with 64-Megabyte Associative Memory, 26 Decimal Digits of Precision, and Hardware Security.
- AN OPERATING SYSTEM that automatically Loads, Links, Overlays, and Executes Application Programs.
- A DATABASE MANAGER that automatically Blocks, Allocates, Opens, and Closes Data Sets.
- MACHINE INTELLIGENCE that automatically Resolves: Program Names, Item Names, Data Types, File Structures, Folder Names, and Instructions to the Robot Programmer™.
- A COMPILER that Produces Self-Loading, Self-Relocating, Serially Reusable Code.
- A PROGRAMMING LANGUAGE that uses Plain-tex Language and Machine Intelligence.
- AN ASSOCIATIVE NETWORK in which Machine Intelligence, Operating System, Compiler, Database Manager, Programming Language, and Application Programs are all interconnected in the 64-Meg Associative Memory.



Even the developers of this technology haven't seen the end of the possibilities. Accept the challenge of working with SAVVY, and it can become whatever you make it.

Your innovative applications that explore the power of SAVVY will be used in future publicized promotions, with credit given to the developer.

To own SAVVY for $950.00 contact your local Apple dealer.

To accept the challenge, contact Excalibur, the developers of SAVVY, for detailed information on this remarkable system.

Excalibur Technologies Corp.
Albuquerque, New Mexico
(505) 242-3333

SAVVY Marketing International markets and distributes SAVVY the Personal Language™ System.

TM - SAVVY, Robot Programmer: Excalibur Technologies Corp.

TM - Personal Language is a trademark of SAVVY Marketing International.

Excalibur
TECHNOLOGIES CORPORATION

CIRCLE 169 ON READER SERVICE CARD

In addition, "wrong" variables can be pulled out of their proper positions and plugged in to produce plots which clearly are not solids of revolution. Figure 14,

$$f(X) = \cos(2X) + \cos((X + BB)/16)$$

is such a plot.

The 3-D plotting module is slower than the others, simply because of the very much greater number of points which must be plotted to give a finished display. If the user is just searching for neat graphics, a cruder but faster trial version can be created by changing line 1430 to read FOR BB = -AA TO AA STEP 5.

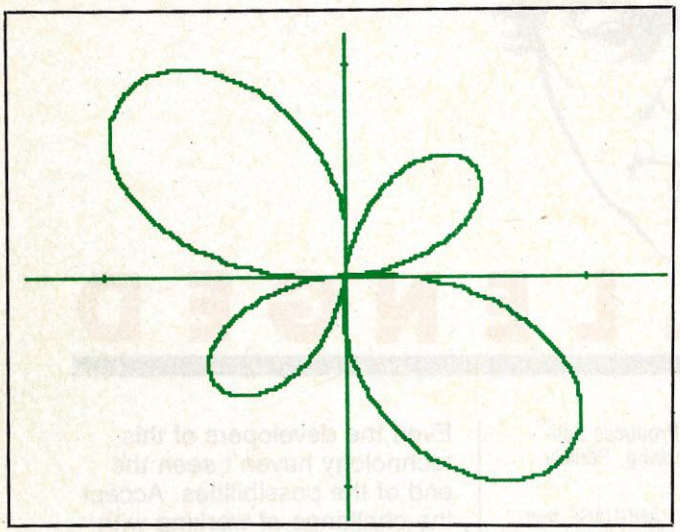


Figure 10.

The two short programs in Listings 2 and 3 are provided so that interesting plots can be saved and retrieved later rather than having to be recreated from scratch every time. After a plot is complete and the program has ended, clear the screen by typing TEXT and a carriage return. (Don't be alarmed—the picture has not been destroyed. It is still in memory although it no longer appears on the screen.) Then load and run the program SAVE PICTURE, which will save the plot on disk as a binary file under a name of your choice. The program DISPLAY PICTURE, similarly, will retrieve a saved plot from the disk and display it on the monitor screen.

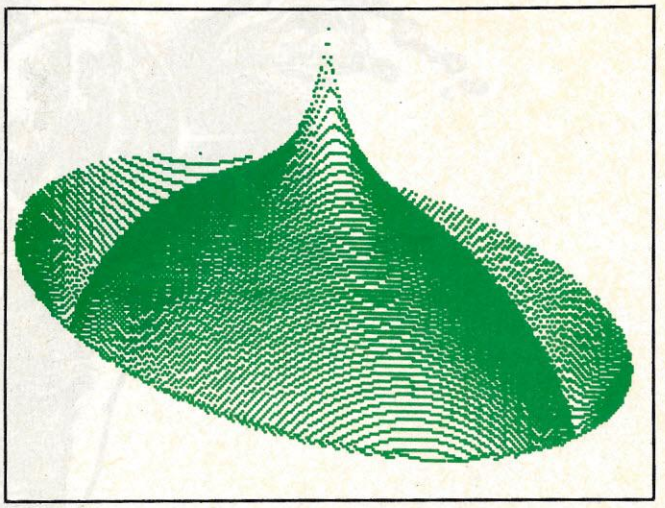


Figure 12.

The program needs only a few detailed comments. For the polar plot routine, the value G in line 690 is θ; r may be found using the Pythagorean theorem by taking X and Y, defined in lines 710 and 720, and setting $r = \sqrt{X^2 + Y^2}$. The result will be that r = f(T) = f(G/57.296), where f is the function the user has defined. (Note that T is in radian measure; this is accomplished in line 700. The Apple and many other small computers do their trigonometry in radians, not degrees.)

For the Cartesian plot module, the values of X and Y are found in lines 910 and 920. Other manipulations merely squeeze these values onto the Apple screen. "Invisible" points in three-dimensional plots are removed by lines 1610-1650, which change the plotting color to black, drop a black line from each plotted point to the bottom of the screen (thus erasing any previously plotted white points directly beneath it), and restore the plotting color to white again.

The program has been written for legibility and clarity, at a slight sacrifice in speed. Most lines contain only one

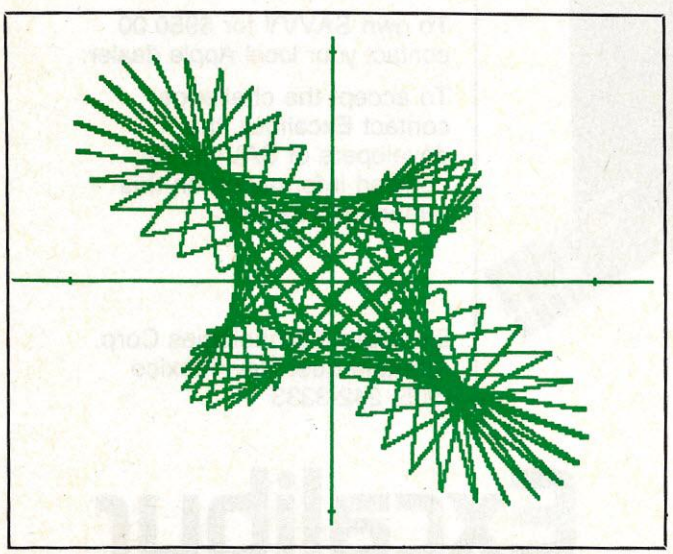


Figure 11.

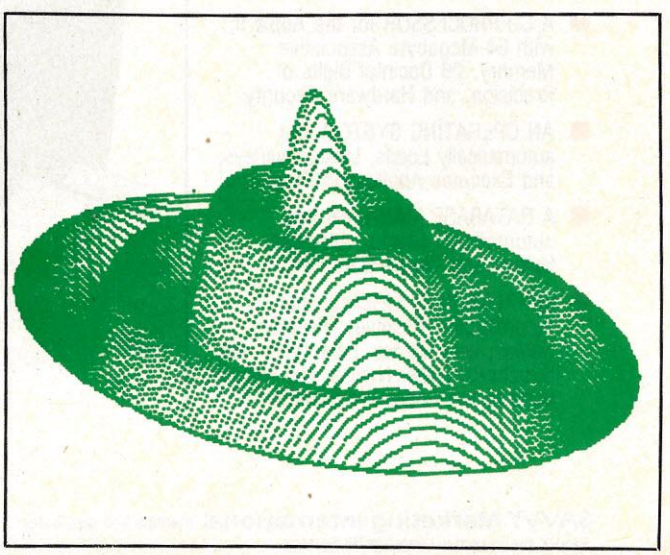
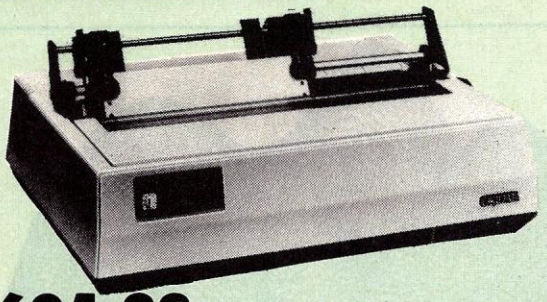


Figure 13.

Microline 83A



$694.88 UPS DELIVERED

- 120 characters per second, bi-directional, logic-seeking print action
- Full 136 columns. 10, 16, 5 & 8 cpi, true U/I case (9-pin printhead)
- Both parallel & RS-232C interfacing standard
- Tractor & friction feed with rear & bottom paper paths
- Okigraph ROM for the Microline 83A **$44.88**

FRANKLIN COMPUTER CORPORATION

ACE1000

The Franklin Ace 1000 includes 64K RAM, upper & lower case character set, alpha-key lock, numeric keypad, 8 peripheral slots, and a built-in cooling fan. The Franklin Ace 1000 has full hardware/software compatability. with the Apple II®

Our special package price includes a **Franklin Ace 1000**, the **Rana Elite One Drive & Controller**, and a **Pi-4 9" Amber Monitor** and cable.

All for only **$1764.40**, UPS delivered.

PRINTERS

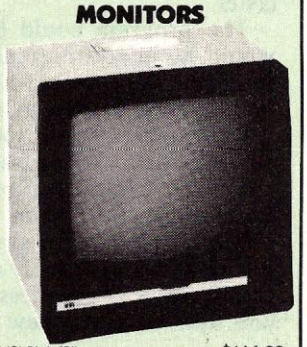
Anadex DP-9500A	$1459.88
Anadex DP-9501A	$1459.88
Anadex DP-9629A	$1549.88
Centronics 122-1	$829.88
Centronics 122-3	949.88
Centronics 352	$1649.88
Centronics 353	$2324.88
C. Itoh Prowriter	$499.88
w/RS-232C	$614.88
C. Itoh Prowriter 2	$734.88
w/RS-232C	$794.88
C.Itoh F-10 Starwriter, 40 cps Parallel or RS-232C	$1499.88
C.Itoh F-10 Printmaster, 55 cps Parallel or RS-232C	$1799.88
F-10 Tractor	$289.88
Daisywriter 2000	$1089.88
Daisywriter Tractor	$149.88
Daisywriter Cable	$49.88
Diablo 620	$1349.88
Diablo 630	$2264.88
Diablo 630 KSR	$2794.88
630 Tractor	$314.88
DMP-85 Printer	$469.88
IDS Microprism	$684.88
IDS Prism 80	$1174.88
Prism 80 w/4-color	$1539.88
IDS Prism 132	$1254.88
Prism 132 w/4-color	$1699.88
Microline 80	$349.88
Microline 82A	$439.88
80/82A Tractor	$59.88
82A Roll Paper Holder	$49.88
82A Okigraph ROM	$44.88
Microline 84 w/graphics, tractor Parallel, 200 cps	$1044.88
RS-232C, 200 cps	$1164.88
NEC PC-8023A	$509.88
NEC 3510	$1929.88
NEC 3530	$1809.88
NEC 3550	$2199.88
3500 Tractor	$239.88
NEC 7710	$2559.88
NEC 7730	$2559.88
7700 Tractor	$359.88

PRINTERS

Qume Sprint 9/45	$2109.88
Smith Corona TP-1 10 or 12 cpi, parallel or RS-232C	$599.88

CALL FOR PRICES on Epson, DIP, MPI, Data-south, Qume and other printers.

MONITORS

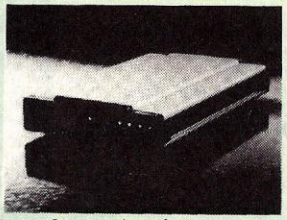


USI Pi-1 (9" green)	$164.88
USI Pi-2 (12" green)	$174.88
USI Pi-3 (12" amber)	$199.88
USI Pi-4 (9" amber)	$169.88
Amdek 300G (12" green)	$174.88
Amdek Color I	$369.88
Amdek Color II (Hi-res RGB)	$799.88
Amdek Color III (RGB)	$494.88
Electrohome 1 (RGB)	$339.88
Electrohome 2 (Hi-res RGB)	$594.88
Princeton Graphic Systems (Hi-res RGB)	$699.88
Zenith TVM 121 (12" green)	$139.88

APPLE PERIPHERALS

PKASO Smart Printer Interfaces	
Centronics card & cable	$139.88
Epson card & cable	$139.88
IDS card & cable	$139.88
IDS Color card & cable	$159.88
NEC/C. Itoh card & cable	$139.88
Okidata card & cable	$139.88

MODEMS



Hayes Smartmodems feature programability in any language, auto dial & auto answer, full & half duplex, keyboard control, user-selectable prameters, 7 LED status lights & an audio monitor. Comes complete with power supply and modular telephone cable.

300 Baud	$239.88
1200 Baud	$569.88
Micromodem-II	$299.88
w/Software	$339.88
Novation Apple Cat 1200	$579.88
Novation Apple Cat 300	$334.88
Novation 1200 Upgrade	$324.88
Novation Auto Cat 300	$224.88
Novation Auto-Cat 1200	$569.88
Novation Cat	$159.88
Novation D Cat	$159.88
Signalman Mark 1	$89.88

APPLE PERIPHERALS

Grappler Plus	$149.88
Parallel Card w/cable	$89.88
Rana Systems	
Elite 1 Disk Drive	$354.88
Elite 2 Disk Drive	$534.88
Disk Controller	$109.88
Corona Data Systems	
5mB Hard Disk	$2049.88
10mB Hard Disk	$2469.88
MicroSoft	
Premium Package 16K RAMCard, Z80 SoftCard, Videx VideoTerm w/soft video switch, & CP/M Users Guide	$519.88
Z80 SoftCard	$269.88
16K RAMcard	$139.88
Mountain Computer	
5mB Hard Disk	$2549.88
10mB Hard Disk	$2939.88
Card Reader	$1399.88
CPS MultiFunction	$174.88
A/D—D/A Convertor	$314.88
RAMplus 16K+ RAMcard	$164.88
RAMplus 32K+ RAMcard	$189.88
ROMplus+	$144.88
ROMwriter Card	$159.88
SuperTalker	$179.88
Practical Peripherals	
16K Microbuffer II	$224.88
32K Microbuffer II	$254.88
Saturn Systems	
32K RAM Board	$204.88
64K RAM Board	$359.88
128K RAM Board	$504.88
SSM AIO Multi-Function Card	$194.88
Videx	
VideoTerm	$239.88
w/Soft Video Switch	$269.88
Enhancer II	$119.88
Vista	
A-800 Disk Controller for 8" disks	$499.88
Vision 80 Card	$249.88

Information & Orders

(603)-673-8857

Orders Only: (800)-343-0726

NO HIDDEN CHARGES

FREE UPS shipping on all orders—No extra charge to use credit cards—All equipment shipped factory fresh with manufacturer's warranty—COD orders accepted ($10 fee added)—No purchase orders accepted—No foreign or APO orders accepted—Minimum $50 per order—Prices subject to change.

MasterCard VISA

HIGH TECHNOLOGY AT AFFORDABLE PRICES

THE BOTTOM LINE

MEMBER

MILFORD NH 03055-0423

Ride the wabash® express

5¼" $1.99* SINGLE SIDE SINGLE DENSITY W/HUB RING 100% CERTIFIED 2 YEAR WARRANTEE SOFT, 10 OR 16 SECTORS

8" $1.99* SINGLE SIDE SINGLE DENSITY 100% CERTIFIED 2 YEAR WARRANTEE SOFT OR 32 SECTORS

5¼" $2.19* SINGLE SIDE DOUBLE DENSITY W/HUB RING 100% CERTIFIED 2 YEAR WARRANTEE SOFT, 10 or 16 SECTORS

8" $2.49* SINGLE SIDE DOUBLE DENSITY 100% CERTIFIED 2 YEAR WARRANTEE SOFT OR 32 SECTORS

5¼" $2.99* DOUBLE SIDE DOUBLE DENSITY W/HUB RING 100% CERTIFIED 2 YEAR WARRANTEE SOFT, 10 OR 16 SECTORS

8" $3.09* DOUBLE SIDE DOUBLE DENSITY 100% CERTIFIED 2 YEAR WARRANTEE SOFT OR 32 SECTORS

* • Minimum order 10
• Packed 10 boxes of 10 diskettes with sleeves and labels
• Quantity discounts – 100 deduct 5%, 1,000 deduct 7%, 5,000 deduct 10%
• Add $5.00 per case 5¼", $7.00 per case 8" (case of 100) For shipping and handling Continential U.S.A., U.P.S. ground.

VINYL STORAGE PAGES 5¼" or 8" 10/$5

SNAP-IT POWER CENTER Turn one outlet into six
• Shock-safe
• Unbreakable
• 15 Amp Circuit Breaker
• Lighted On-Off Switch $19.95

DISK DRIVE HEAD CLEANING KITS Prevent head crashes and ensure error-free operation 5¼" or 8" $19.50

HARDHOLE DISK PROTECTORS Reinforcing rings of tough mylar protect disk hole edge from damage.

	5¼"	8"
Applicators	$3	$4
Hardhole Rings (50)	$6	$8

SFD C- 10 CASSETTES .. 10/$7 (All cassettes include box and labels.) Get 8 cassettes, C-10 Sonic, and Cassette/8 Library-Album, as illustrated, for only $8

LIBRARY CASES 8" Kas-sette/10 ..... $2.99 5¼" Mini Kas-sette/10 ... $2.49

We also stock at FANTASTIC low prices MAXELL 3M DYSAN BASF OPUS Floppies, Tape, Data Cartridges, Data Cassettes, and Disk Packs

• Written purchase orders accepted from government agencies and well rated firms for net 30 day billing. • International orders accepted with a 15.00 surcharge for handling, plus shipping charges. • C.O.D. requires a 10% deposit. • We accept Visa, Mastercharge, Money Orders, and Certified checks. • Checks require bank clearances. • All shipments F.O.B. San Diego. • Minimum shipping and handling 2.00, minimum order 10.00. • California residents add 6% sales tax. Prices and terms subject to change without notice. • All sales subject to availability, acceptance, and verification. • All sales are final. • Satisfaction guaranteed or full refund.

We also offer printer ribbons, printwheels, type elements, equipment covers, power consoles, paper supplies, storage and filing equipment, furniture and many other accessories for word and data processing systems. Write for our free catalog.

ABC DATA PRODUCTS (FORMERLY ABM)

Toll Free Order Only 800-854-1555 For Information or California Orders (714) 268-3537

8868 CLAIREMONT MESA BLVD. SAN DIEGO, CALIFORNIA 92123

CIRCLE 102 ON READER SERVICE CARD

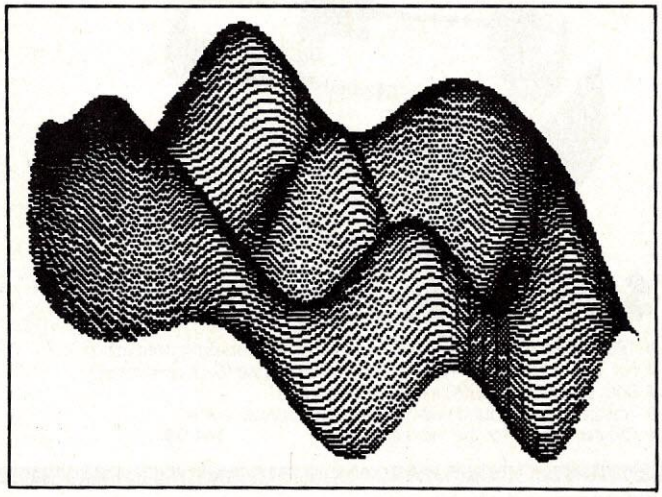


Figure 14.

program command. The FOR-NEXT loops which do the actual plotting have been indented to make their operation as understandable as possible, and to make it easy to translate them into other flavors of Basic. Of course, if you have an Applesoft compiler, you can compile the program into machine language, which will run much faster.

The program could be developed in several ways. It would be interesting and not difficult to include scaling routines which would allow plotting on logarithmic and semilog axes as well as on linear ones.

Using shape-table methods, a graphic character set could be defined and used to label the axes.

Finally, I have seen published explanations of ways to enter a function from the keyboard in response to a prompt, while the program is running—something Applesoft does not ordinarily allow. Inclusion of such a routine would make it unnecessary to change line 170 whenever you want to plot a new function. □

```
10   TEXT  : HOME
20   PRINT : PRINT : PRINT
30   PRINT   "THE CURRENT FUNCTION IS DEFINED AS:
40   PRINT : LIST 170
50   PRINT
60   PRINT   "DO YOU WISH
70   PRINT
80   PRINT   "  1) A CARTESIAN PLOT
90   PRINT   "  2) A POLAR PLOT
100  PRINT   "  3) A THREE-DIMENSIONAL PLOT
110  PRINT
120  PRINT : INPUT "ENTER 1, 2, OR 3. ";PL
130  PRINT
140  :
150  REM  ------------------------------------------
160  :
170  DEF  FN R(Q) =  COS (Q) +  COS (2 * Q) +  COS (5 * Q)
180  :
190  REM  ------------------------------------------
200  :
210  IF PL = 3 THEN 1010
220  IF PL < > 1 AND PL < > 2 AND PL < > 3 THEN 120
230  :
240  TEXT  : HOME
250  PRINT : PRINT
260  INPUT   "FUNCTION INCREMENT = ";I: PRINT
270  PRINT
280  PRINT   "TO EXPAND OR CONTRACT THE AXES, ENTER
290  PRINT   "A SCALING FACTOR.  FOR EXAMPLE,
300  PRINT   "TO DOUBLE THE SCALE, ENTER 2.
310  PRINT   "TO HALVE IT, ENTER .5.
320  PRINT
330  INPUT   "X-AXIS SCALING FACTOR = ";S1
340  PRINT
350  INPUT   "Y-AXIS SCALING FACTOR = ";S2
360  PRINT
```

```
370  PRINT    "TO MOVE THE ORIGIN LEFT OR RIGHT,
380  INPUT    "ENTER A NUMBER FROM -130 TO 130. ";C
390  PRINT
400  PRINT    "TO MOVE THE ORIGIN UP OR DOWN,
410  INPUT    "ENTER A NUMBER FROM -90 TO 90. ";D
420  :
430  HGR : POKE  -16302, 0
440  HCOLOR = 3
450      E = 96 + D
460      F = 139 + C
470          HPLOT F, 0 TO F, 191
480          HPLOT 0, E TO 278, E
490              FOR XR = F TO 278 STEP 19 * S1
500                  HPLOT XR, E - 1 TO XR, E + 1: NEXT XR
510              FOR XL = F TO 0 STEP  -19 * S1
520                  HPLOT XL, E - 1 TO XL, E + 1: NEXT XL
530              FOR YD = E TO 191 STEP 15 * S2
540                  HPLOT F - 1, YD TO F + 1, YD: NEXT YD
550              FOR YU = S TO 0 STEP  -15 * S2
560                  HPLOT F - 1, YU TO F + 1, YU: NEXT YU
570  :
580  IF PL = 1 THEN 820
590  IF PL = 2 THEN 610
600  :
610  REM  ------------------------------------------------
620  :
630  REM               ****************
640  REM               *              *
650  REM               *  POLAR PLOT  *
660  REM               *              *
670  REM               ****************
680  :
690  FOR G = 0 TO 360 STEP I
700      T = G / 57.29579
710          X =  FN R(T) *  COS (T)
720          Y =  FN R(T) *  SIN (T)
730             XX =   X * (19 * S1) + F
740             YY =  -Y * (15 * S2) + E
750                IF XX < 0 OR XX > 279 THEN 780
760                IF YY < 0 OR YY > 191 THEN 780
770             HPLOT XX, YY
780  NEXT G
790  :
800  STOP
810  :
820  REM  ------------------------------------------------
830  :
840  REM               ********************
850  REM               *                  *
860  REM               *  CARTESIAN PLOT  *
870  REM               *                  *
880  REM               ********************
890  :
900  FOR G = 0 TO 278 STEP I
910     X = (G - F) / (19 * S1)
920     Y =  FN R(X)
930        YY = E - (Y * 15 * S2)
940           IF YY < 0 OR YY > 191 THEN 960
950        HPLOT G,YY
960  NEXT G
970  :
980  STOP
990  :
1000 REM  ------------------------------------------------
1010 :
1020 REM               ****************************
1030 REM               *                          *
1040 REM               *  THREE-DIMENSIONAL PLOT  *
1050 REM               *                          *
1060 REM               ****************************
1070 :
1080 HOME
1090 PRINT : PRINT
1100 PRINT    "TO EXPAND OR COMPRESS THE PLOT
1110 PRINT    "VERTICALLY, ENTER A NUMBER
1120 INPUT    "FROM -40 TO 40 (20 IS TYPICAL). ";N1
1130 PRINT : PRINT
1140 PRINT    "TO MOVE THE PLOT UP OR DOWN
1150 PRINT    "ON THE SCREEN, ENTER A NUMBER
1160 INPUT    "FROM -50 TO 150 (90 IS TYPICAL). ";N2
1170 :
1180 REM  ------------------------------------------------
1190 :
1200 REM   CONSTANTS = A, B, C, D, E, F, G
1210 REM   FOR-NEXT VARIABLES = H, BB
1220 REM        DEPENDENT ON H = AA, BB
1230 REM        DEPENDENT ON H AND BB = CC, D1, DD
1240 REM   PLOTTING VARIABLES = X, X1, Y, Y1
1250 REM        DEPENDENT ON BB AND H = X, X1
1260 REM        DEPENDENT ON DD AND H = Y, Y1
1270 :
1280            A = 144
1290            B = 2.25
1300            C = N1
1310            D = .0327
1320            S = 160
```


VIC20 PERSONAL COMPUTER

TOP 10 SALE!!
ARCADE GAMES
(VIC-20 TAPE PROGRAMS)

Rank	Name	List	Sale
1.	Super Paratrooper (Fantastic)	$24.95	$19.95
2.	Exterminator-Plus (Better than Centipede)	$24.95	$19.95
3.	Cricket (Better than Frogger)	$24.95	$19.95
4.	3-D Hackman (3-Dimensional)	$24.95	$19.95
5.	Snackman (Better than Packman)	$19.95	$15.95
6.	Bug Blast (Creepy)	$19.95	$16.95
7.	Anti Matter Splatter (Nuclear Disaster)	$24.95	$19.95
8.	Bombs Away (Great)	$18.95	$15.95
9.	3-D Maze-Escape	$16.95	$14.95
10.	Krazy Kong	$16.95	$14.95

BUY ANY FOUR — DEDUCT 10% MORE

VIC-20 ACCESSORY SALE!!

1. TRACTION-FRICTION LINE PRINTER This new COM-STAR deluxe printer, prints 8½" x 11" full size letter quality single, roll or fan fold paper, labels and etc. Impact dot matrix bi-directional 40, 66, 80, 132 columns. Includes interface cable that plugs direct into the VIC-20 computer, no other costly interface is needed. List $599.00 — Sale $399.00.

2. UP TO 60K EXPANSION MODULE Aero Space designed—6 slot—add up to 6 cartridges—switch select any program. Start and stop any program with reset button—not necessary to remove cartridges or turn off computer, saves time, television and computer (one year warranty) List $149.00 — Sale $89.00.

- **10 DAY FREE TRIAL**
- **WE HAVE THE LOWEST PRICES**
- **ONE DAY DELIVERY EXPRESS MAIL**
- **FREE CATALOGS**
- **WE LOVE OUR CUSTOMERS!**

PROTECTO ENTERPRIZES (FACTORY-DIRECT)

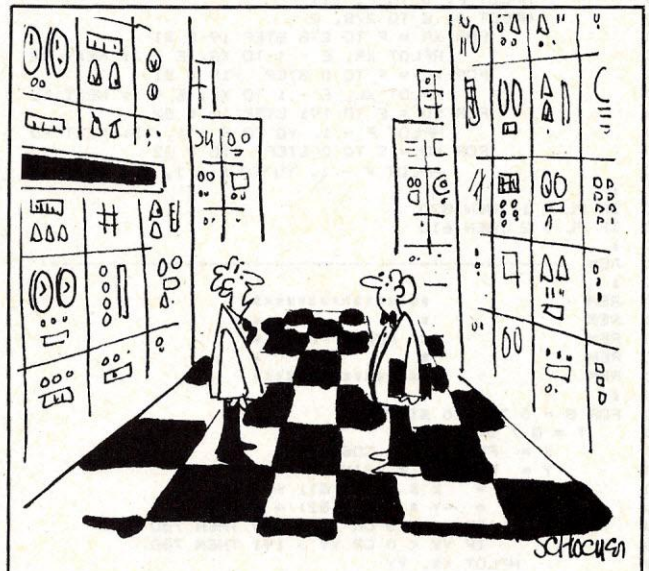
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

CIRCLE 238 ON READER SERVICE CARD

```
1330            F = N2
1340            G = 199
1350  :
1360  REM  ------------------------------------------------
1370  :
1380  HGR : POKE  -16302, 0
1390  HCOLOR = 3
1400  :
1410  FOR H =  - A TO A STEP B
1420    AA =  INT (.5 +  SQR (A ^ 2 - H ^ 2))
1430       FOR BB =  - AA TO AA
1440          CC =  SQR (BB ^ 2 + H ^ 2) * D
1450             D1 =  FN R(CC)
1460                DD = D1 * C
1470                   GOSUB 1520
1480       NEXT BB
1490  NEXT H
1500  :
1510  STOP
1520  :
1530  REM  ------------------------------------------------
1540  :
1550  X = BB + (H / B) + E
1560  Y = DD - (H / B) + F
1570     X1 = INT (.85 * X)
1580     Y1 = INT (.9 * (G - Y))
1590        IF Y1 < 0 OR Y1 > 190 THEN  RETURN
1600     HPLOT X1,Y1
1610  :
1620  REM  ERASE BACKGROUND
1630     HCOLOR= 0: REM  BLACK
1640     HPLOT X1, (Y1 + 1) TO X1, 190
1650     HCOLOR= 3: REM  WHITE AGAIN
1660  :
1670  RETURN
```

```
100  REM  --- SAVE PICTURE ---
110  :
120  PRINT:PRINT:PRINT
130  INPUT "NAME OF PICTURE? ";A$
140  PRINT CHR$(4);"BSAVE ";A$;"A$2000,L$1FFF"
150  END
```

```
100  REM  --- DISPLAY PICTURE ---
110  :
120  PRINT:PRINT:PRINT
130  PRINT CHR$(4);"BLOAD ";A$;",A$2000"
140  POKE  -16302, 0
150  POKE  -16304, 0
160  POKE  -16297, 0
170  POKE  -16300, 0
180  END
```



"They had a disagreement. Now they're no longer exchanging data."

Revised and updated!

Stereo Review's **SRT14-A**

STEREO TEST RECORD

THE EDITORS AND TECHNICAL STAFF OF STEREO REVIEW PRESENT THE MOST COMPREHENSIVE, ACCURATE AND EASY-TO-USE TEST RECORD EVER DEVELOPED. SRT14-A HAS BEEN REVISED AND UPDATED FROM THE ORIGINAL SRT14 VERSION USING MORE SOPHISTICATED TEST SIGNALS TO MAKE THE JOB OF SETTING UP AND EVALUATING YOUR SYSTEM EVEN EASIER.

This latest version contains everything you need to get the fullest, most realistic reproduction from your stereo equipment. Whether you've spent thousands on your stereo system or have a more modest setup, the SRT14-A is an indispensable tool for helping you realize the full potential of your equipment. Best of all, you don't have to be an electronics engineer to use it. You can actually perform a complete stereo system checkup by ear alone.

A test lab in a record jacket

Employing the most advanced recording, mastering, and pressing techniques, the Stereo Review SRT14-A is produced to strict laboratory standards. Engraved in its grooves are a series of precisely recorded test tones, frequency sweeps, and pink noise signals that enable you to accurately analyze and check your stereo system for:

- Frequency response.
- Stereo separation.
- Cartridge tracking ability.
- Channel balance.
- Hum and noise, including turntable rumble.
- Wow and flutter.
- Optimum speaker placement.
- Cartridge Tracking Force & Anti-skating.
- Musical Instrument Tuning Standards, and more . . . much more.

Step-by-step instructions

Included with SRT14-A is a detailed instruction manual, complete with charts, tables, and diagrams. This takes you step by step through the testing process. It explains the significance of each test. It tells you what to listen for. It clearly describes any aberrations in system response. And it details corrective procedures.

For professionals too

The usefulness of the SRT14-A is not confined to the nontechnical listener. Included on the record are a series of tests that call for the use of sophisticated measuring instruments, such as oscilloscopes, chart recorders, and distortion analyzers. These tests permit the advanced audiophile and professional to make precise measurements of transient response, recorded signal velocity, anti-skating compensation, IM distortion, and a host of other performance characteristics.

SRT14-A record contents

- CARTRIDGE TRACKING, HIGH FREQUENCY
- FREQUENCY RESPONSE, 20 kHz to 25 Hz
- SEPARATION, LEFT-TO-RIGHT
- SEPARATION, RIGHT-TO-LEFT
- CARTRIDGE TRACKING, LOW FREQUENCY
- CHANNEL BALANCE
- CARTRIDGE AND SPEAKER PHASING
- LOW-FREQUENCY NOISE
- TURNTABLE FLUTTER
- FREQUENCY-RESPONSE SWEEP, 500 TO 20,000 Hz, LEFT CHANNEL
- FREQUENCY-RESPONSE SWEEP, 500 Hz TO 20,000 Hz, RIGHT CHANNEL
- TONE BURST
- INTERMODULATION DISTORTION
- ANTI-SKATING ADJUSTMENT
- 1000-Hz REFERENCE TONES
- FLUTTER AND SPEED ACCURACY
- STEREO SPREAD
- STANDARD "A"
- CHROMATIC OCTAVE
- GUITAR TUNING TONES

The final step

Start getting the most out of your stereo system. Make the SRT14-A your next record purchase. Just complete the coupon and mail it along with your remittance . . . today!

Test Record, Dept. 30013, P.O. Box 278, Pratt Station, Brooklyn, NY 11205

Please send _____ SRT14-A Stereo Test Records @ $9.95 each ($11.95 outside U.S.A.)

☐ Enclosed is $_____*

☐ CHARGE: ☐ VISA ☐ MasterCard ☐ Diners Club ☐ American Express

CHARGE ORDERS— PHONE 24 HRS. TOLL FREE 800-345-8112 IN PA ONLY 800-662-2444

Account #_____ Exp. Date _____

Signature _____

Print Name _____

Address _____

City/State/Zip _____

*Residents of CA, CO, DC, FL, IL, MA, MI, MO, NJ, NY State, OH, SC, TN, and VT add applicable sales tax.

256K Card for IBM $299.95*

Printers on Sale

NEW EPSONS with GRAFTRAX-plus

MX-80FT with GRAFTRAX-plus *same as MX-80 with friction feed and pin feed.*
PRM-28082 *MX-80FT w/GRAFTRAX-plus* **$539.95**

MX-100 with GRAFTRAX-plus *132/232 column, correspondence quality, up to 15" paper, friction feed & adjustable pin feed, 18 x 18 dot matrix, 80 CPS.*
PRM-28100 *MX-100 w/GRAFTRAX-plus* **$729.95**

PRA-27084 *Serial interface* **$54.95**
PRA-27088 *Serial intf & 2K buffer* **$99.95**
PRA-27081 *Apple card* **$39.95**
PRA-27082 *Apple cable* **$19.95**
PRA-27086 *IEEE 488 card* **$59.95**
PRA-27087 *TRS-80 cable* **$24.95**
PRA-27097 *GRAFTRAX-plus 80* **$59.95**
PRA-27197 *GRAFTRAX-plus 100* **$64.95**
PRA-27090 *MX-80, FT print head* **$44.95**
PRA-27190 *MX-100 print head* **$49.95**
PRA-27083 *MX-80 ribbon cart.* **$13.95**
PRA-27101 *MX-100 ribbon only* **$9.95**

BETTER THAN EPSON ! - Okidata

Microline 82A *80/132 column,* ***120 CPS****, 9 x 9 dot matrix, friction feed, pin feed, adjustable tractor feed (optional), handles 4 part forms up to 9.5" wide, rear & bottom feed, paper tear bar, 100% duty cycle/200,000,000 character print head, bi-directional/logic seeking,* ***both serial & parallel interfaces included****, front panel switch & program control of 10 different form lengths, uses inexpensive spool type ribbons, double width & condensed characters, true lower case descenders & graphics*
PRM-43082 *Friction & pin feed* **$479.95**

Microline 83A *132/232 column, 120 CPS, forms up to 15" wide, removable tractor, plus all the features of the 82A.*
PRM-43083 *with FREE tractor* **$699.95**

Microline 84 *132/232 column, Hi-speed 200 CPS, full dot graphics built in, plus all the features of the 83A.*
PRM-43084 *Centronics parallel* **$1099.95**
PRM-43085 *Serial with 2K buffer* **$1149.95**

PRA-27081 *Apple card* **$39.95**
PRA-27082 *Apple cable* **$19.95**
PRA-27087 *TRS-80 cable* **$24.95**
PRA-43081 *2K hi speed serial card* **$99.95**
PRA-43082 *Hi-res graphics ROMs 82A* **$49.95**
PRA-43083 *Hi-graphics ROMs 83A* **$49.95**
PRA-43088 *Tractor option for 82A* **$49.95**
PRA-43080 *Extra ribbons pkg. of 2* **$9.95**

8023 DOT MATRIX - NEC

100 CPS, proportional spacing, hi-resolution graphics, correspondence quality printing, bi-directional tractor & friction feed.
NEC-8023A *8023 parallel* **$499.95**
NEC-8023-01 *8023 ribbon* **$11.95**

TP-1 LETTER QUALITY - SCM

12 CPS daisy wheel printer from Smith Corona.
PRD-45101 *Centronics parallel* **$648.95**
PRD-45102 *RS-232C serial* **$648.95**

LETTER QUALITY PRINTER - Jade

Uses standard daisy wheels and ribbon cartridges, 16 CPS bi-directional printing, semi-automatic paper loader (single sheet or fan fold), 10/12/15 pitch, up to 16" paper, built-in noise suppression cover.
PRD-11001 *Centronics parallel* **$899.95**
PRD-11002 *RS-232C serial model* **$969.95**
PRA-11000 *Tractor Option* **$169.95**

KSR DAISY WHEEL - Anderson-Jacobson

Letter quality communications terminal/printer with full typewriter keyboard, 30 CPS Diablo print mechanism, RS-232 interface, includes free printer stand with deluxe casters, print wheel, ribbon, friction feed standard (tractor feed optional), factory refurbished with 30 day warranty, shipped freight collect.
PRD-99100 *AJ KSR printer* **$995.00**
PRA-99200 *Tractor option* *$150.00*

PRINTER PALS - F.M.J. Inc.

Desk top printer stand and continuous form paper holder.
PRA-99080 *for MX-80, MX-80FT, Oki 82A, NEC* .. **$29.95**
PRA-99100 *for MX-100, Oki 83A & 84* **$34.95**
PRA-99700 *for letter quality printers* **$49.95**

5¼" Disk Drives

Tandon TM100-1 *single-sided double-density 48 TPI*
MSM-551001 ..... $219.95 ea 2 for **$199.95 ea**

Shugart SA400L *single-sided double-density 40 track*
MSM-104000 ..... $234.95 ea 2 for **$224.95 ea**

Shugart SA455 *half-size double-sided 48 TPI*
MSM-104550 ..... $349.95 ea 2 for **$329.95 ea**

Shugart SA465 *half-size doule-sided 96 TPI*
MSM-104650 ..... $399.95 ea 2 for **$379.95 ea**

Tandon TM100-2 *double-sided double-density 48 TPI*
MSM-551002 ..... $294.95 ea 2 for **$269.95 ea**

Shugart SA450 *double-sided double-density 35 track*
MSM-104500 ..... $349.95 ea 2 for **$329.95 ea**

Tandon TM100-3 *single-sided double-density 96 TPI*
MSM-551003 ..... $294.95 ea 2 for **$269.95 ea**

Tandon TM100-4 *double-sided double-density 96 TPI*
MSM-551004 ..... $394.95 ea 2 for **$374.95 ea**

MPI B-51 *single-sided double-density 40 track*
MSM-155100 ..... $234.95 ea 2 for **$224.95 ea**

MPI B-52 *double-sided double-density 40 track*
MSM-155200 ..... $344.95 ea 2 for **$334.95 ea**

MPI B-91 *single-sided double-density 77 track*
MSM-155300 ..... $369.95 ea 2 for **$359.95 ea**

MPI B-92 *double-sided double-density 77 track*
MSM-155400 ..... $469.95 ea 2 for **$459.95 ea**

5¼" Cabinets with Power Supply

END-000216 *Single cab w/power supply* **$69.95**
END-000226 *Dual cab w/power supply* **$94.95**

8" Disk Drives

Shugart SA810 *half-size single-sided double-density*
MSF-108100 ..... $424.95 ea 2 for **$394.95 ea**

Shugart SA860 *half-size double-sided double-density*
MSF-108600 ..... $574.95 ea 2 for **$549.95 ea**

Shugart SA801R *single-sided double-density*
MSF-10801R ..... $394.95 ea 2 for **$389.95 ea**

Shugart SA851R *double-sided double-density*
MSF-10851R ..... $554.95 ea 2 for **$529.95 ea**

Tandon TM848-1 *single-sided double-den thin-line*
MSF-558481 ..... $379.95 ea 2 for **$369.95 ea**

Tandon TM848-2 *double-sided double-den thin-line*
MSF-558482 ..... $494.95 ea 2 for **$484.95 ea**

Qume DT-8 *double-sided double-density*
MSF-750080 ..... $524.95 ea 2 for **$498.95 ea**

Mitsubishi M2894-63 *double-sided double-density*
MSF-289463 ..... $494.95 ea 2 for **$474.95 ea**

Siemens FDD 100-8 *single-sided double-density*
MSF-201120 ..... $384.95 ea 2 for **$349.95 ea**

Dual Disk Sub-Systems

Disk Sub-Systems - Jade

Handsome metal cabinet with proportionally balanced air flow system, rugged dual drive power supply, power cable kit, power switch, line cord, fuse holder, cooling fan, never-mar rubber feet, all necessary hardware to mount 2-8" disk drives, power supply, and fan, does not include signal cable.

Dual 8" Sub-Assembly Cabinet

END-000420 *Bare cabinet* **$59.95**
END-000421 *Cabinet kit* **$225.00**
END-000431 *A & T* **$359.95**

8" Sub-Systems - Single Sided, Double Density

END-000423 *Kit w/2 FD100-8Ds* **$975.00**
END-000424 *A & T w/2 FD100-8Ds* **$1175.00**
END-000433 *Kit w/2 SA-801Rs* **$999.95**
END-000434 *A & T w/2 SA-801Rs* **$1195.00**

8" Sub-Systems - Double Sided, Double Density

END-000426 *Kit w/2 DT-8s* **$1224.95**
END-000427 *A & T w/2 DT-8s* **$1424.95**
END-000436 *Kit w/2 SA-851Rs* **$1274.95**
END-000437 *A & T w/2 SA-851Rs* **$1474.95**

Prices may be slightly higher at our retail locations. Please contact the store in your area for exact pricing.

IBM PC Accessories

512K PC/RAM STACK - Hammond

A high quality, high density memory expansion board for your PC, cool-quiet-reliable operation, full parity checking, unique stacking sockets, expandable from 256K to 512K, MDRIVE high speed RAMdisk software only $25.00 with 256K or 512K board purchase.
MEX-25600A *256K assembled & tested* **$795.00**
MEX-51200A *512K assembled & tested* **$999.95**
MEX-25600S *MDRIVE disk emulator* **$25.00**

256K PC/RAM - Hammond Engineering

* *User expandable from 64K to 256K, same high quality standards as the RAM Stack above, designed for medium memory expansion requirements.*
* **MEX-64000A** *64K assembled & tested* **$299.95**
MEX-128000A *128K assembled & tested* **$399.95**
MEX-192000A *192K assembled & tested* **$499.95**
MEX-256000A *256K assembled & tested* **$569.95**

PC/SASI RAM - Hammond Engineering

Three boards in one, 256K of RAM, RS-232 asynchronous serial interface, and a SASI (Shugart Assoc Standard Interface) hard disk interface.
IOX-6000A *PC/SASI RAM* **$1095.00**

PC EXTENDER CARD - Computel

High quality extender card with free connectors for IBM PC bus.
TSX-300A *A & T with connectors* **$42.95**

WIRE WRAP BOARD - Computel

Highest quality, extremely versatile proto typing board with gold plated card edge for IBM PC.
TSX-310A *Proto board* **$59.95**

Jade Bus Probe

THE BUS PROBE - Jade

Inexpensive S-100 Diagnostic Analyzer

So your computer is down. And you don't have an oscilloscope. And you don't have a front panel... You're not alone - most computers have their occasional bad days. But without diagnostic equipment such as an oscilloscope (expensive!) or a front panel (expensive!), it can be very difficult to pinpoint the problem. Even if you have an extender board with a superfast logic probe, you can't see more than one signal at a time. You're stuck, right?

Not anymore; Jade is proud to offer our cost-effective solution to the problems mentioned above: ***THE BUS PROBE.***

Whether you're a hobbyist with a cantankerous kluge or a field technician with an anxious computer owner breathing down your neck, you'll find THE BUS PROBE speeds your repair time remarkably. Just plug in THE BUS PROBE and you'll be able to see all the IEEE S-100 signals in action. THE BUS PROBE allows you to see inputs, outputs, memory reads and writes, instruction fetches, DMA channels, vectored interrupts, 8 or 16 bit wide data transfers, plus the three bus supply voltages.

An on-board pulse generator can provide repetitive resets, interrupts, or wait states, for trouble shooting.

TSX-200B *Bare board* **$59.95**
TSX-200K *Kit* **$119.95**
TSX-200A *A&T* **$149.95**

Place Orders Toll Free

Continental U.S. **800-421-5500**
Inside California **800-262-1710**

For Technical Inquires or Customer Service call:
213-973-7707

JADE
Computer Products

4901 W. Rosecrans, Hawthorne, CA 90250

We accept cash, checks, credit cards, or Purchase Orders from qualified firms & institutions. **Minimum prepaid order $15** California residents add 6½% tax. Export customers outside the US or Canada please add 10% to all prices. **Prices and availibility subject to change without notice.** Shipping & handling charges via UPS Ground 50¢/lb, UPS Air $1.00/lb **minimum charge $3.00**

Disk Drive for Apple $289.95

Modems

SIGNALMAN - Anchor
Direct-connect automatic answer/originate selection, 300 Baud full duplex, Bell 103, includes RS-232 cable
IOM-5600A *Signalman* **$89.95**

SMARTMODEM - Hayes
Sophisticated direct-connect auto-answer/auto-dial modem, touch-tone or pulse dialing, RS-232C interface, programmable
IOM-5400A *Smartmodem* **$224.95**
IOK-1500A *Hayes Chronograph* **$218.95**
IOM-2010A *Micromodem II* **$328.95**
IOM-2012A *Terminal program for MMII* **$89.95**
IOM-1100A *Micromodem 100* **$368.95**

APPLE-CAT - Novation
Software selectable 1200 or 300 Baud, direct connect, auto-answer/auto-dial,touch & pulse dialing, auxiliary 3-wire RS-232C serial port for printer
IOM-5232A *Save $50.00* **$324.95**

1200 BAUD SMARTMODEM - Hayes
1200 and 300 baud, all the features of the standard Smartmodem plus 1200 baud, 212 compatible, full or half duplex.
IOM-5500A *Smartmodem 1200* **$599.95**

1200 BAUD AUTO CAT - Novation
212 Auto Cat, 1200 & 300 baud, auto dial/answer/disconnect, LED readout displays mode, analog/digital loop-back self tests, usable with multi-line phones.
IOM-5231A *212 Auto Cat* **$649.95**

Video Monitors

HI-RES 12" GREEN - Zenith
15 MHz bandwith 700 lines/inch, P31 green phosphor, switchable 40 or 80 columns, small, light-weight & portable.
VDM-201201 *List price $189.95* **$129.95**

12" GREEN SCREEN - NEC
20 MHz bandwidth, P31 phosphor ultra-high resolution video monitor with audio.
VDM-651200 *Deluxe model* **$199.95**
VDM-651260 *Economy model* **$149.95**

12" COLOR MONITOR - NEC
High resolution color monitor with audio.
VDC-651212 *Color monitor* **$389.95**
NEC-1202D *RGB color monitor* **$999.95**

13" COLOR MONITORS - BMC
18 MHz RGB & composite video color monitors.
VDC-421320 *13" RGB Color* **$329.95**
VDC-421310 *13" Composite video* **$299.95**
VDX-420090 *RGB card for Apple* **$149.95**

COLOR MONITORS - Amdek
Reasonably priced color video monitors.
VDC-80130 *13" Color I* **$379.95**
VDC-801320 *13" Color II* **$894.95**
IOV-2300A *DVM board for Apple* **$199.95**

AMBER or GREEN MONITORS - Jade
High resolution 18 MHz compact video monitors.
VDM-751210 *12" Amber phosphor* **$149.95**
VDM-751220 *12" Green phosphor* **$139.95**
VDM-750910 *9" Amber phosphor* **$149.95**
VDM-750920 *9" Green phosphor* **$139.95**

EPROM Erasers

ULTRA-VIOLET EPROM ERASERS
Inexpensive erasers for industry or home.
XME-3100A *Spectronics w/o timer* **$69.50**
XME-3101A *Spectronics with timer* **$94.50**
XME-3200A *Economy model* **$39.95**

Single User System

THREE BOARD SET - SD Systems
4 MHz Z-80A CPU, 64K RAM (optional 256K), serial I/O port, parallel I/O port, double density disk controller, CP/M 2.2 & manual set, system monitor, control & diagnostic software. Includes SBC-200, 64K ExpandoRAM II, Versafloppy II, & CP/M 2.2 - all boards are assembled & tested.
Board set with 64K of RAM **$1095.00**
Board set with 256K of RAM **$1295.00**

Apple II Accessories

APPLE DISK DRIVE - Fourth Dimension
Totally Apple compatible, 143,360 bytes per drive on DOS 3.3, half-track capability - reads all Apple software, plugs right in to Apple controller as second drive, DOS 3.3, 3.2.1, Pascal, & CP/M compatible.
MSM-123200 *40 Track add on Apple drive* **$289.95**
MSM-123200 *Controller with free DOS 3.3* **$99.95**

16K RAM CARD - for Apple II
Expand your Apple II to 64K, use as language card, full 1 year warranty. Why spend $175.00 ?
MEX-16700A *Save over $100.00* **$69.95**

Z-80 CPU CARD - for Apple II
Two computers in one, Z-80 & 6502, more than doubles the power and potential of your Apple, includes Z-80 CPU card CP/M and complete manual set.
CPX-62800A *A & T with software* **$249.95**

APPLE-CAT - Novation
Software selectable 1200 or 300 baud, direct connect, auto-answer/auto-dial, auxiliary 3-wire RS232C serial port for printer.
IOM-5232A *Save $50.00!!!* **$325.95**

8" DISK CONTROLLER - Vista
New from Vista Computer, single or double sided, single or double density, compatible with DOS 3.2/3.3, Pascal, & CP/M 2.2, Shugart & Qume compatible
IOD-2700A *A & T* **$499.95**

2 MEGABYTES for Apple II
Complete package includes: Two 8" double-density disk drives, Vista double-density 8" disk controller, cabinet, power supply, & cables, DOS 3.2/3.3, CP/M 2.2, & Pascal compatible.
1 MegaByte Package *Kit* **$1495.00**
1 MegaByte Package *A & T* **$1695.00**
2 MegaByte Package *Kit* **$1795.00**
2 MegaByte Package *A & T* **$1995.95**

VISION 80 - Vista Computer
80 column x 24 line video card for Apple II, 128 ASCII characters, upper and lower case, 9 x 10 dot matrix with 3 dot descenders, standard data media terminal control codes, CP/M Pascal & Fortran compatible, 50/60 Hz
IOV-2400A *Vista Vision 80* **$299.95**

CPS MULTICARD - Mtn. Computer
Three cards in one! Real time clock/calendar, serial interface, & parallel interface - all on one card.
IOX-2300A *A & T* **$179.95**

HI-RES GRAPHICS CARD - Genie
Intelligent printer interface and control card allows full high resolution graphics and screen dumps.
IOP-2405A *Genie for Epson* **$119.95**
IOP-2410A *Genie for Okidata* **$119.95**
IOP-2415A *Genie for NEC/C. Itoh* **$119.95**

Power Strips

ISOBAR - GSC
Isolates & protects your valuable equipment from high voltage spikes & AC line noise, inductive isolated ground, 15 amp circuit breaker, U.L. listed
EME-115103 *3 socket* **$39.50**
EME-115105 *4 socket* **$49.50**
EME-115100 *8 socket* **$54.50**
EME-115110 *9 socket rackmount* **$74.50**

Single Board Computer

SUPERQUAD - Adv. Micro Digital
Single board, standard size S-100 computer system, 4 MHz Z-80A, single or double density disk controller for 5¼" or 8" drives, 64K RAM, extended addressing, up to 4K of EPROM, 2 serial & 2 parallel I/O ports, real time interrupt clock, CP/M compatible.
CPC-30800A *A & T* **$724.95**
IOX-4232A *Serial I/O adapter* **$29.95**

Z-80 STARTER KIT - SD Systems
Complete Z-80 microcomputer with RAM, ROM, I/O, keyboard, display, kludge area, manual, & workbook.
CPS-30100K *Kit with workbook* **$299.95**
CPS-30100A *A & T with workbook* **$469.95**

AIM-65 - Rockwell International
Complete 6502 microcomputer with alphanumeric display, printer, keyboard, & instruction manual.
CPK-50165A *1K AIM-65* **$424.95**
CPK-50465A *4K AIM-65* **$474.95**
SFK-74600008E *8K Basic ROM* **$64.95**
SFK-64600004E *4K assembler ROM* **$43.95**
SFK-74600020E *PL/65 ROM* **$84.95**
SFK-74600010E *Forth ROM* **$64.95**
SFK-74600030E *Instant Pascal* **$99.95**
PSX-030A *Power supply* **$64.95**
ENX-000002 *Enclosure* **$54.95**

SPECIAL PACKAGE
4K AIM-65, 8K Basic, power supply, & enclosure
Special Package Price **$649.95**

S-100 EPROM Boards

PROM-100 - SD Systems
2708, 2716, 2732 EPROM programmer with software.
MEM-99520K *Kit with software* **$189.95**
MEM-99520A *A & T with software* **$249.95**

PB-1 - SSM Microcomputer
2708, 2716 EPROM board with on-board programmer.
MEM-99510K *Kit with manual* **$154.95**
MEM-99510A *A & T with manual* **$219.95**

EPROM BOARD - Jade
16K or 32K uses 2708 or 2716 EPROMs, 1K boundary.
MEM-16230K *Kit w/o EPROMs* **$79.95**
MEM-16230A *A & T w/o EPROMs* **$119.95**

S-100 Video Boards

SPECTRUM COLOR - CompuPro
Full-function color graphics board, up to 8 colors, 256 x 192 graphics, parallel I/O port, 8K RAM.
IOV-1870A *A & T* **$348.95**
IOV-1870C *CSC* **$398.95**

MICROANGELO - Scion
Ultra-high-resolution 512 x 480, 256 color or black & white S-100 video board
IOV-1500A *A & T* **$799.95**

S-100 MotherBoards

ISO-BUS - Jade
Silent, simple, and on sale - a better motherboard
6 Slot (5¼" x 8⅝")
MBS-061B *Bare board* **$22.95**
MBS-061K *Kit* **$39.95**
MBS-061A *A & T* **$69.95**
12 Slot (9¾" x 8⅝")
MBS-121B *Bare board* **$34.95**
MBS-121K *Kit* **$69.95**
MBS-121A *A & T* **$109.95**
18 Slot (14½" x 8⅝")
MBS-181B *Bare board* **$54.95**
MBS-181K *Kit* **$99.95**
MBS-181A *A & T* **$149.95**

ACTIVE TERMINATOR - CompuPro
A true mother's helper.
TSX-100A *A & T* **$59.45**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

64K Static RAM $299.95

S-100 CPU Boards

8086/8087 - CompuPro
16 bit, 8 or 10 MHz 8086 CPU with provisions for 8087 & 80130.
CPU-70520A *8 MHz 8086 A & T* **$624.95**
CPU-70520C *8 MHz 8086 CSC* **$764.95**
CPU-70530A *with 8087 A & T* **$1224.95**
CPU-70530C *with 8087 CSC* **$1455.95**

8085/8086 - CompuPro
Both 8 & 16 bit CPUs, standard 8 bit S-100 bus, up to 8 MHz, accesses 16 Megabytes of memory.
CPU-20510A *6 MHz A & T* **$398.95**
CPU-20510C *6/8 MHz CSC* **$497.95**

CPU-Z - CompuPro
2/4 MHz Z80A CPU, 24 bit addressing.
CPU-30500A *2/4 MHz A & T* **$279.95**
CPU-30500C *3/6 MHz CSC* **$374.95**

SBC-200 - SD Systems
4 MHz Z-80A CPU with serial & parallel I/O, 1K RAM, 8K ROM space, monitor PROM included.
CPC-30200A *A & T* **$399.95**

THE BIG Z - Jade
2 or 4 MHz switchable Z-80 CPU board with serial I/O, accomodates 2708, 2716, or 2732 EPROM, baud rates from 75 to 9600.
CPU-30201B *Bare board w/manual* **$35.00**
CPU-30201K *Kit with manual* **$149.95**
CPU-30210A *A & T with manual* **$199.95**

CB-2 - SSM Microcomputer
2 or 4 MHz Z-80 CPU board with provision for up to 8K of ROM or 4K of RAM on board, extended addressing, IEEE S-100, front panel compatible.
CPU-30300K *Kit with manual* **$229.95**
CPU-30300A *A & T with manual* **$274.95**

2810 Z-80 CPU - C.C.S.
2 or 4 MHZ Z-80 CPU with serial I/O port & on-board monitor PROM, front panel compatible.
CPU-30400A *A & T with PROM* **$289.95**

2820 Z-80 DMA CPU - C.C.S.
4 MHz Z-80 CPU board with 2 serial I/O ports & Centronics parallel I/O port, separate data & status ports, DMA daisy chain compatible.
CPU-30420A *A & T with manual* **$569.95**

S-100 Disk Controllers

DISK 1 - CompuPro
8" or 5¼" DMA disk controller, single or double density, single or double sided, 10 MHz.
IOD-1810A *A & T* **$449.95**
IOD-1810C *CSC* **$554.95**
SFC-52506580F *8" CP/M 2.2 for Z-80* **$174.95**
SFC-52506586F *8" CP/M 2.2 for 8086* **$299.95**
SFO-54158000F *Oasis single user* **$499.95**
SFO-54158002F *Oasis multi-user* **$849.95**

VERSAFLOPPY II - SD Systems
Double density disk controller for any combination of 5¼" and 8" single or double sided, analog phase-locked loop data separator, vectored interrupts, CP/M 2.2 & Oasis compatible, control/diagnostic software PROM included.
IOD-1160A *A & T with PROM* **$359.95**
SFC-55009047F *CP/M 2.2 with VF II* **$99.95**

2242 DISK CONTROLLER - C.C.S.
5¼" or 8" double density disk controller with on-board boot loader ROM, free CP/M 2.2 & manual set.
IOD-1300A *A & T with CP/M 2.2* **$399.95**

DOUBLE D - Jade
High reliablity double density disk controller with on-board Z-80A, auxiliary printer port, IEEE S-100, can function in multi-user interrupt driven bus.
IOD-1200B *Bare board & hdwr man* **$59.95**
IOD-1200K *Kit w/hdwr & sftwr man* **$299.95**
IOD-1200A *A & T w/hdwr & sftwr man* **$325.95**
SFC-59002001F *CP/M 2.2 with Double D* **$99.95**

S-100 Memory Boards

256K RAMDISK - SD Systems
ExpandoRAM III expandable from 64K to 256K using 64K x 1 RAM chips, compatible with CP/M, MP/M, Oasis, Cromemco, & most other Z-80 based systems, functions as ultra-high speed disk drive when used with optional RAMDISK software.
MEM-65064A *64K A & T* **$474.95**
MEM-65128A *128K A & T* **$574.95**
MEM-65192A *192K A & T* **$674.95**
MEM-65256A *256K A & T* **$774.95**
SFC-55009000F *RAMDISK sftwr CP/M 2.2* **$44.95**
SFC-55009000F *RAMDISK with EXRAM III* **$24.95**

128K RAM 21 - CompuPro
128K x 8 bit or 64K x 16 bit static RAM board, 12 MHz, 24 bit addressing.
MEM-12810A *A & T* **$1609.95**
MEM-12810C *CSC* **$1794.95**

64K RAM 17 - CompuPro
64K CMOS static RAM board, 10 MHz, low power less than 4 watts, DMA compatible, 24 bit addressing.
MEM-64180A *64K A & T* **$549.95**
MEM-64180C *64K CSC* **$698.95**

64K RAM 16 - CompuPro
32K x 16 bit or 64K x 8 bit low power static RAM board, 10 MHz, 24 bit addressing.
MEM-32180A *RAM 16 A & T* **$598.95**
MEM-32180C *RAM 16 CSC* **$698.95**

64K STATIC RAM - SSM
IEEE 696/S-100 standard, up to 6MHz/8 Bit, 12MHz/16 Bit, 24 Bit extended addressing, disable-able in 2K increments
MEM-64300A *A & T* **$499.95**

64K STATIC RAM - Mem Merchant
64K static S-100 RAM card, 4 to 16K banks up to 8 MHz.
MEM-64400A *64K A & T* **$499.95**

64K STATIC RAM - Jade
Uses new 2K x 8 static RAMs, fully supports IEEE 696 24 bit extended addressing, 200ns RAMs, lower 32K or entire board phantomable, 2716 EPROMs may be subbed for RAMs, any 2K segment of upper 8K may be disabled, low power typically less than 500ma.
MEM-99152B *Bare board* **$49.95**
MEM-99152K *Kit less RAM* **$99.95**
MEM-32152K *32K kit* **$199.95**
MEM-56152K *56K kit* **$289.95**
MEM-64152K *64K kit* **$299.95**
Assembled & Tested ..... **add $50.00**

2066 64K RAM - C.C.S.
64K RAM board with bank and block select switching functions for Cromemeco Cromix & Alpha Micro.
MEM-64566A *64K A & T* **$424.95**

64K EXPANDORAM II - SD Systems
Expandable RAM board from 16K to 64K using 4116 RAM chips.
MEM-16630A *16K A & T* **$344.95**
MEM-32631A *32K A & T* **$364.95**
MEM-48632A *48K A & T* **$384.95**
MEM-64633A *64K A & T* **$399.95**

MEMORY BANK - Jade
4 MHz S-100 bank selectable expandable to 64K.
MEM-99730B *Bare board w/manual* **$49.95**
MEM-99730K *Kit with no RAM* **$179.95**
MEM-32731K *32K kit* **$199.95**
MEM-64733K *64K kit* **$249.95**
Assembled & Tested ..... **add $50.00**

16K STATIC RAM - Mem Merchant
4MHz lo-power static RAM board, IEEE S-100, bank selectable, addressable in 4K blocks, disable-able in 1K segments extended addressing.
MEM-16171A *16K A & T* **$149.95**

S-100 I/O Boards

SYSTEM SUPPORT 1 - CompuPro
Real time clock, three 16 bit interval timers, dual interrupt controllers(15 levels), up to 4K EPROM/RAM, RS-232C serial channel, provision for 9511A/9512 math chip.
IOX-1850A *SS1 A & T* **$359.95**
IOX-1850C *SS1 CSC* **$459.95**
IOX-1855A *with 9511 A & T* **$554.95**
IOX-1855C *with 9511 CSC* **$654.95**
IOX-1860A *with 9512 A & T* **$554.95**
IOX-1860C *with 9512 CSC* **$654.95**

INTERFACER 1 - CompuPro
2 serial I/O ports 50-19.2K baud.
IOI-1810A *A & T* **$218.95**
IOI-1810C *CSC* **$288.95**

INTERFACER 2 - CompuPro
3 parallel, 1 serial, & interrupt timer.
IOI-1820A *A & T* **$218.95**
IOI-1820C *CSC* **$288.95**

INTERFACER 3 - CompuPro
5 or 8 channel serial I/O board for interrupt driven multi-user systems up to 250K baud.
IOI-1835A *5 port A & T* **$558.95**
IOI-1835C *5 port CSC* **$628.95**
IOI-1838A *8 port A & T* **$628.95**
IOI-1838C *8 port CSC* **$749.95**

INTERFACER 4 - CompuPro
3 serial, 1 parallel, 1 Centronics parallel.
IOI-1840A *A & T* **$314.95**
IOI-1840C *CSC* **$414.95**

MPX - CompuPro
Multi-user I/O multiplexer & interrupt controller with on-board 8085A-2 CPU & 4K or 16K of RAM.
IOI-1875A *4K MPX A & T* **$444.95**
IOI-1875C *4K MPX CSC* **$534.95**
IOI-1880A *16K MPX A & T* **$584.95**
IOI-1880C *16K MPX CSC* **$674.95**

I/O-8 - SSM Microcomputer
Eight software programmable serial I/O ports, 110 -19.2K Baud, ideal for multi-user systems
IOI-1018A *A & T* **$469.95**

I/O-5 - SSM Microcomputer
Two serial & 3 parallel I/O ports, 110-19.2K Baud
IOI-1015A *A & T* **$289.95**

MPC-4 - SD Systems
Intelligent 4-port serial I/O card, on-board Z-80A, 2K RAM, 4K PROM area, on-board firmware, fully buffered, vectored interrupts, four CTC channels, add to SD Board set for powerful multi-user system
IOI-1504A *A & T w/software* **$495.00**

I/O-4 - SSM Microcomputer
2 serial I/O ports plus 2 parallel I/O ports.
IOI-1010B *Bare board w/manual* **$35.00**
IOI-1010K *Kit with manual* **$179.95**
IOI-1010A *A & T with manual* **$249.95**

2830 6 PORT SERIAL - C.C.S.
Six asynchronous RS-232C serial I/O ports with programmable baud rates.
IOI-1040A *A & T with manual* **$529.95**

2710 4 PORT SERIAL - C.C.S.
Four RS-232C serial I/O ports with full handshaking.
IOI-1060A *A & T with manual* **$319.95**

2719 2 SER & 2 PAR - C.C.S.
Two RS-232C serial I/O ports plus two 8 bit parallel I/O ports.
IOI-1080A *A & T with manual* **$349.95**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

CIRCLE 189 ON READER SERVICE CARD

Linked Lists Are Alive And Well In Computer Graphics

Mark Coleman

What in the world is a linked list? *Linked List* is a fancy buzz phrase that means each position in the list contains, among other things, a map showing how to get to the next position in the list, much like a treasure hunt.

Lists that are not linked are called sequential lists. In a sequential list, the next element in the list must be in the next storage location. However in a linked list the next element value may be stored anywhere, since each element has a pointer to the location of the next element. Figure 1 shows the list (A, B, D, E, F) in both forms.

There are many advantages and disadvantages to linked lists. One disadvantage is that they take up more memory since links must be stored along with element values. One advantage is the ease of inserting or deleting elements. Say we want to insert C between B and D.

Figure 2 shows that in the sequential list all elements after B must move one storage location in the list to make room for C. This can take a great deal of time if the list is very long. But in a linked list all that need be done is change the value of the link at B so it points at the storage position of C and make the link of C point to D.

Mark D. Coleman, 2960 Brookwood, Ft. Collins, CO 80525.

In a doubly linked list, each element has two links, one pointing to the next element and one pointing to the previous element as shown in Figure 3.

In the example above, the links are actually the values of the next storage

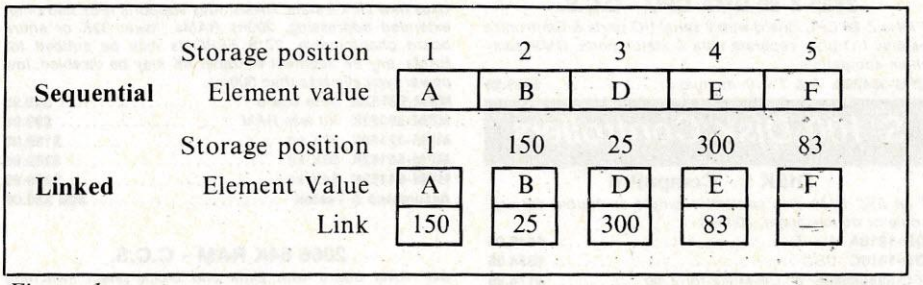


Figure 1.

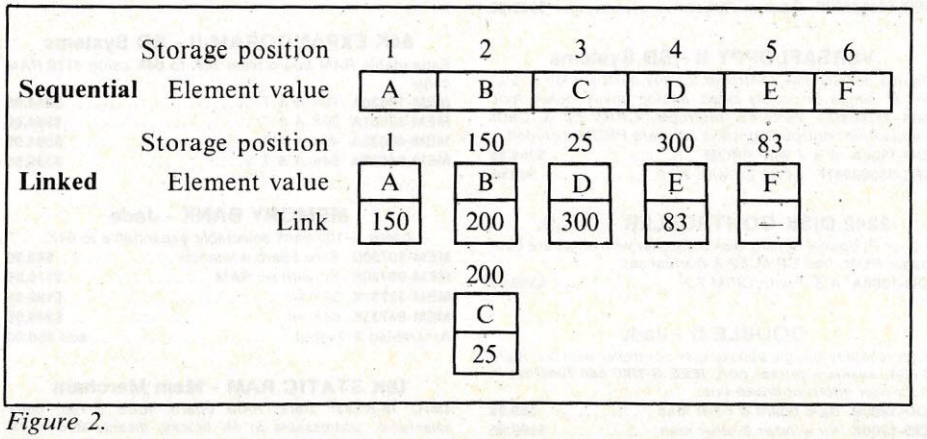


Figure 2.

COMPUTERS & ELECTRONICS

WIN AN ATARI® SWEEPSTAKES

Save up to 33% on *Computers & Electronics*, too!

The Computers & Electronics Sweepstakes is open to all our readers. No purchase is necessary—and you'll receive a fantastic Atari home computer system worth over $1600 if you're the lucky winner!

How the Sweepstakes works

Just mail the attached card or the coupon below after filling in your name and address. Be sure to indicate whether you're also subscribing to *Computers & Electronics* at the special rates shown—you can save as much as 33%.

Then, if you win, you'll get a superb Atari personal computer system: the Atari 800 with 16K RAM and 10K ROM...an 810 Disk Drive... a 16K RAM Memory Module for extra memory... a pair of Joystick Controllers for game interaction. Use the Atari to handle small business and professional applications as well as sophisticated home processing functions—and, of course, for entertainment. Analyze your investments, learn languages, do business accounting, play video games. Programmable in Basic or Assembly, the 800 can use all Atari peripherals and can control up to four disk drives and a 60 lpm printer. In all, the 800 and its accessories form a package worth a full $1620 at retail!

You're sure to win with *Computers & Electronics!*

Whether you win our Sweepstakes or not, the hours you spend on a personal computer—or with home electronics projects—are certain to be winners when you subscribe to *Computers & Electronics* (formerly *Popular Electronics).* It's the Number One magazine in its field—concentrating on computers, but packed with news of audio equipment, communications and electronics.

Why not enjoy a year or more of *Computers & Electronics* at our low introductory prices? You'll save up to 33% if you subscribe at the same time you enter our Sweepstakes!

Atari is a registered trademark of Atari, Inc.

OFFICIAL RULES

No Purchase Necessary

1. On an official entry form or a 3" x 5" piece of paper, hand print your name, address and zip code. Enter as often as you wish, but mail each entry separately to Computers & Electronics Sweepstakes, P.O. Box 2785, Boulder, Colorado 80322. Entries must be received no later than March 31, 1983, and the drawing will be held by April 21, 1983. All entries become the property of Computers & Electronics, which reserves the right to reprint the name and address of the winner.
2. The winner will be selected in a random drawing from among all entries received, under the supervision of the publishers of Computers & Electronics, whose decision will be final. Only one prize will be awarded in this Sweepstakes. Winner will be notified by mail and may be required to execute affidavit of eligibility and release. Odds of winning will depend on the number of entries received. Ziff-Davis will arrange delivery of prize. Taxes are the responsibility of the winner. Any manufacturer's warranties will apply, but Ziff-Davis makes no warranties with regard to any prizes. Prize is not transferable. No substitutions for prizes.
3. Sweepstakes open to all residents of the U.S., its territories and possessions, except employees (and their families) of Ziff-Davis Publishing Company, its affiliates, and its advertising and promotion agencies. Void wherever prohibited or restricted by law.
4. For the winner's name, send a stamped, self-addressed envelope to Computers & Electronics Sweepstakes, Circulation Department, Ziff-Davis Publishing Company, One Park Avenue, New York, N.Y. 10016.

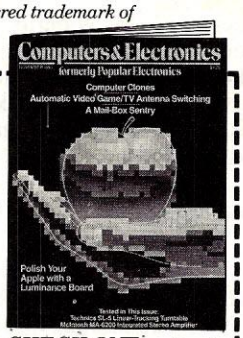
OFFICIAL ENTRY FORM

Mail to: **Computers & Electronics Sweepstakes**
P.O. Box 2785, Boulder, Colorado 80322

☐ **YES!** Enter my name in the Computers & Electronics Sweepstakes, and start my subscription to *Computers & Electronics* for the term checked:

- ☐ One year (12 issues) only $12.97—19% off!
- ☐ Two years only $22.97—28% off!
- ☐ Three years only $31.97—33% off!

Savings based on full one-year subscription price of $15.97.



CHECK ONE:
☐ Payment enclosed.
☐ Bill me later.

☐ **NO** I don't wish to subscribe now, but tell me if I've won the Computers & Electronics Sweepstakes.

8H427

Mr./Mrs./Ms. _____
(please print full name)

Address _____ Apt. _____

City _____ State _____ Zip _____

Offer valid only in the U.S., its territories and possessions. Please allow 30 to 60 days for delivery of first issue if you subscribe.

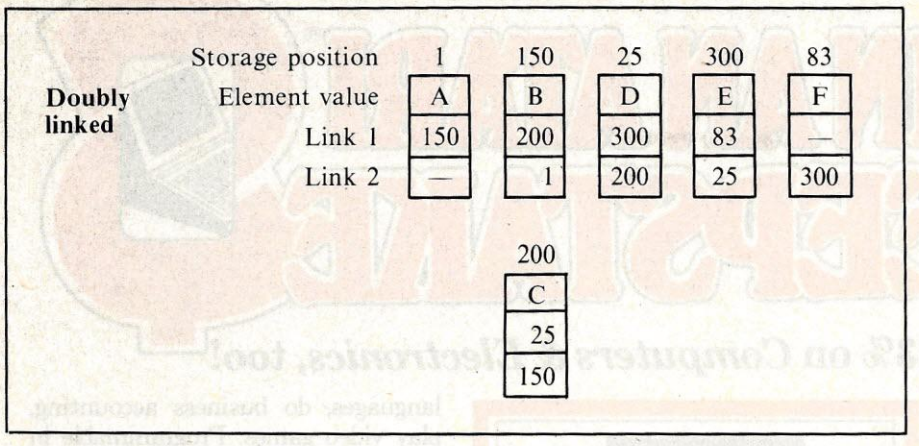


Figure 3.

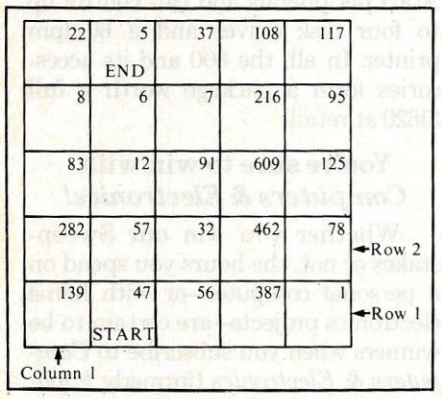


Figure 4.

A(1, 5)=22	A(2, 5)=5	A(3, 5)=37	A(4, 5)=108	A(5, 5)=117
A(1, 4)=8	A(2, 4)=16	A(3, 4)=7	A(4, 4)=216	A(5, 4)=95
A(1, 3)=83	A(2, 3)=12	A(3, 3)=91	A(4, 3)=609	A(5, 3)=125
A(1, 2)=282	A(2, 2)=57	A(3, 2)=32	A(4, 2)=462	A(5, 2)=78
A(1, 1)=139	A(2, 1)=47	A(3, 1)=56	A(4, 1)=387	A(5, 1)=1

Figure 5.

location. In general, links are any pieces of information which point to the location of the next value. This article shows how linked lists can be useful in solving a game known as Magic Path.

The Game

The game goes like this. Given the 5x5 matrix in Figure 4, draw a line which starts at START and ends at END. The line may not cross the same square twice, it may not go diagonally or out of the matrix, and the sum of the numbers crossed by the line must be 1958. Sounds easy.

I spent a few minutes trying to figure out a short cut solution, but soon decided that a systematic trial and error approach would be faster. All I had to do was try each possible path. Figuring out how to do this systematically is where the fun comes in.

The Algorithm

Since the matrix is a two-dimensional array, I decided to store the data in the same form. For a given square, the first subscript of the array corresponds to the column and the second subscript corresponds to the row as shown in Figure 5.

But how do I decide which direction to go from any given square? There are only four directions that are legal so I numbered them 1 to 4 as in Figure 6.

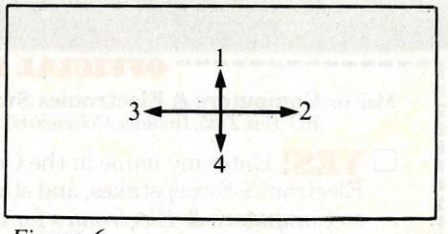


Figure 6.

When I first enter a square I will try to exit from it in direction 1. If for some reason I cannot exit in the desired direction — if I run into an edge or the new total will exceed 1958 — then I simply increment my direction pointer and try the next direction. If that direction doesn't work, I increment it again and again until I find a direction I can go or until I exhaust all four possible directions. For example, in Figure 7, directions 1 and 2 from square H go off the matrix, so direction 3 is chosen making I the next square.

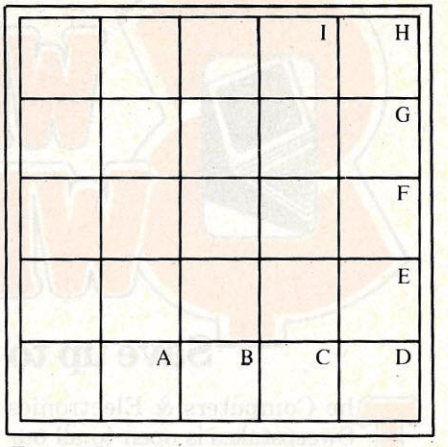


Figure 7.

To generate the Row (x), Column (y) coordinates of the next square, I wrote a "direction decoder" routine which relates the direction number 1 to 4 to the required change in subscripts.

```
IF D=1 THEN Y=Y+1
IF D=2 THEN X=X+1
IF D=3 THEN X=X-1
IF D=4 THEN Y=Y-1
```

But what if I exhaust all possible directions from a given square, the classic "You can't get there from here" problem? I must then go back to the previous square on the path and try the next direction from that square. For example trying to select the next square from square "216" in Figure 8 results in: direction 1 crosses a square twice; direction 2 crosses a square twice; direction 3 crosses a square twice; direction 4 causes sum to be greater than 1958.

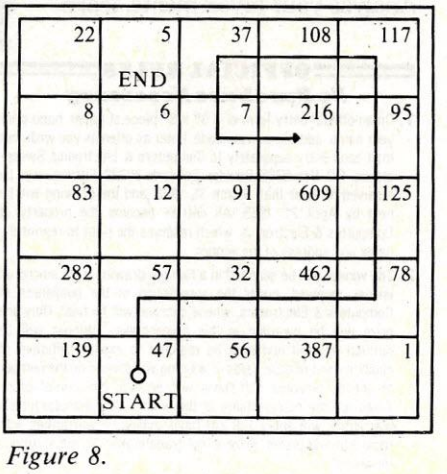


Figure 8.

In this case square 216 must be eliminated from the path and the next direction must be selected from square 7.

January 1983 © Creative Computing

SJB DISTRIBUTORS. THE MOST COMPETITIVE PRICES ON COMMODORE PRODUCTS.

commodore

INTERFACES

ADA-1450 Serial	$149
ADA-1600 Parallel	149
RS232 cable for Vic or 64, 2m	30
Video/Audio cable for 64 & monitor	25

MONITORS — Great resolution for the CBM 64 or VIC

Panasonic, 13" Color	$375
Amdek Color I	330
NEC JB 1201M, 12" Color	330
NEC JB 1201, 12" green phosphor	170
Amdek Video 300L, green phosphor	175

BUSINESS SOFTWARE

Spellmaster Dictionary (great for WordPro!)	$199
OZZ Data Base System (8050)	240
Silicon Office (database, wp)	995 (New)
Wordcraft 80	289
VisiCalc (new expanded)	199
Dow Jones Portfolio Management System (RS232)	120
WordPro 4+ or 5+	299
The Manager	199
Legal Time Accounting	425
I.R.M.A.	295
BPI A/R, G/L, Job Cost, Inventory, Payroll	325/pkg

SJB will service any VIC or CBM64.

MasterCard, Visa, Money Order, Bank Check
COD (add $5) accepted.
Add 3% surcharge for credit cards.
In stock items shipped within 48 hours, F.O.B., Dallas, TX.
All products shipped with manufacturer's warranty.

TO ORDER CALL TOLL FREE
800-527-4893 800-442-1048 (Within Texas)
SJB will meet any competitive price under similar in-stock conditions.

SJB DISTRIBUTORS, INC.
10520 Plano Road, Suite 206
Dallas, Texas 75238
(214) 343-1328

Business Hours:
M-F 8 to 6
Sat 10 to 2

Prices are subject to change without notice.

SOFTWARE FOR CBM 64

Word Processing	$90
Computer Tutoring Game (COCO)	50
General Ledger	199
Pet Emulator (emulates 4.0 basic)	30
CBM EasyCalc (for the 64)	99
CBM EasyFinance	50
CBM EasyPlot	80
CBM EasyScan (appointment manager)	80
Sprite-Magic (build sprites on screen with Joystick, save to disk or cassette)	30
Assembler Package for CBM 64 (cassette) Editor (creates and updates source code), Assembler, Loader, Disassembler	50
Mail Mate	50
IEEE Interface (64)	100
Parallel Interface	90
RS232 Interface (modems, printers)	45

VIC PRODUCTS

VIC 20 Computer, 5K	$199
Vic Datasette Recorder	60
Vic 1541 Disk Drive	395
VIC MODEM (for CBM 64)	100
VIC 1525 Graphic Printer (for CBM 64)	325
8K Memory Expansion Cartridge	49
16K RAM	99
24K RAM	155
IEEE Interface (VIC)	85
Gorf (great arcade game)	30
Omega Race	30
Midnight Drive	23
VIC 3 slot Expander	43
VIC 6 slot Expander	83
Seawolf	23
Cosmic Cruncher	23

Arcade Joysticks — Heavy duty with 2 firing buttons! Great for the VIC or 64 **$25**

SuperPET (5 languages, 2 processors)	$1409
CBM 8032 Computer, 80 column	1029
CBM Memory Expansion, 64K	359
PET 4032, 40 Column	950
CBM 8050, 1 Mg. Dual Drive	1259
CBM D9060, 5 Mg. Hard Disk	2240
CBM D9090, 7.5 Mg. Hard Disk	2600
CBM 4040, 340K Dual Drive	919
CBM 2031, 170K Single Drive	489

PRINTERS — LETTER QUALITY

CBM 8300,40cps	$1450
Diablo 620,25cps	1350
Nec Spinwriter 7700,55cps	2350
Nec Spinwriter 3500,35cps	1600

PRINTERS — DOT MATRIX

CBM 4022,80cps/graphics	$395
CBM 8023,150 cps/graphics	599
Okidata 82A,120cps/serial or par	449
Nec 8023A(parallel)	499

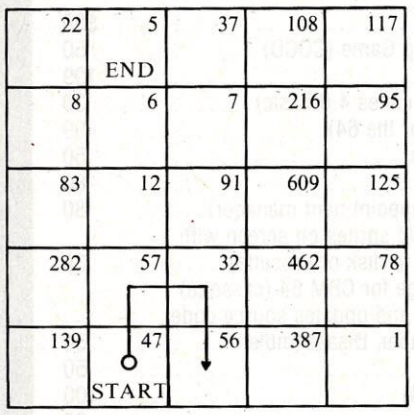
CIRCLE 258 ON READER SERVICE CARD

A(1, 1, 1)=value of square (1, 1)
A(1, 1, 2)=direction to go to find the next square: Forward Link
A(1, 1, 3)=direction to go to find the previous square: Backward Link

A(1, 2, 1)=value of square (1, 2)
A(1, 2, 2)=direction to go to find the next square: Forward Link
A(1, 2, 3)=direction to go to find the previous square: Backward Link

etc.

Figure 9.



A(2, 1, 1)=47 value
A(2, 1, 2)=1 up
A(2, 1, 3)=0

A(2, 2, 1)=57 value
A(2, 2, 2)=2 right
A(2, 2, 3)=4 down

A(3, 2, 1)=32 value
A(3, 2, 2)=4 down
A(3, 2, 3)=3 left

A(3, 1, 1)=56 value
A(3, 1, 2)=0
A(3, 1, 3)=1 up

Figure 10.

Now I realized I had a problem. I needed two pieces of information that I didn't have yet. First of all, square 216 needs to know how to find square 7 and then square 7 needs to know which direction it tried last so it knows which direction to try next, or in other words it needs to know how it got to square 216. I needed "links" forward and backward in the list of squares on the path.

I decided to expand my two-dimensional array, which was storing the values of the squares, into a three-dimensional array as in Figure 9.

The values for the links are the numbers 1 through 4 corresponding to the directions shown in Figure 6. In addition, when a square is not yet on the path, I set the links to zero. This makes it easy to tell whether or not a given square is available or has already been used. Remember that you can't cross a square twice.

To illustrate this scheme consider the path shown in Figure 10.

The zeros arise from the fact that square (2, 1) is the start square so it has no previous square and square (3, 1) is the last square shown so it has no next square.

Once I figured out the linking scheme all I had to do was check for a total of 1958 and current coordinates equal to the END square.

Graphics

To keep myself from feeling completely neglected as my computer solved this problem, I added a few lines to the program to draw the matrix on my screen and to draw and erase the different paths as they were tried. Having the different paths drawn on my CRT not only made the program more fun to watch, but it also made debugging much easier since I already had a mental picture of how the search should proceed.

The machine I used was a Hewlett-

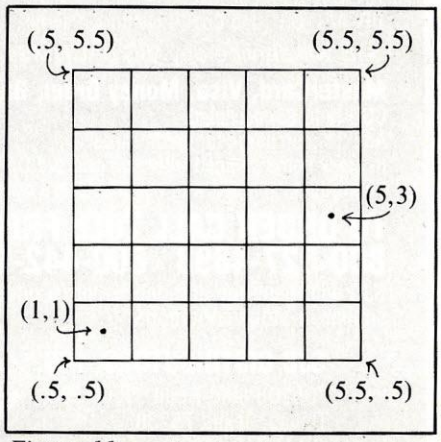


Figure 11.

The Only Database That's Smart Enough For Business Forms.

- Invoicing
- Purchase Orders
- Client Billing
- Medical Claims
- Sales Analysis
- Personnel Records
- Inventory Ledgers
- Mfg. Parts Lists

apple II
apple III
Hard Disk: ProFile, etc.
IBM/PC

VersaForm™
Business Form Processor

Applied Software Technology
14125 Capri Drive
Los Gatos, California 95030
(408) 370-2662

CIRCLE 300 ON READER SERVICE CARD

IMAGINE IT...

NEW

Buffer Options Available Up To 64K

CAPTURE IT.

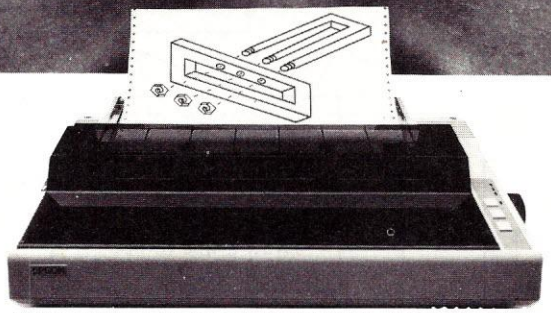
Completely Redesigned. Now, the Grappler+.
The original Grappler was the first graphics interface to give you hi-res screen dumps from your keyboard. The new Grappler+ with *Dual Hi-Res Graphics* adds flexibility with a side-by-side printout of page 1 and page 2 graphics.

Interfacing the Grappler+ to a wide range of printers is easy as changing a dip switch. 4K of exclusive firmware makes the Grappler+ the most intelligent, full-featured Apple® Printer Interface made. And, the Grappler+ is Apple III compatible.*

Up to 64K Buffer Option
An optional Bufferboard can now be added to all existing Grappler and Grappler+ interfaces. See your Apple Dealer for details.

*Requires additional software driver.
**Requires graphics upgrade.

©Orange Micro, Inc. 1982



ACTUAL APPLE II PRINTOUT USING GRAPPLER AND EPSON MX100.

With The Grappler™+ Printer Interface

CPM is a registered trademark of Digital Research, Inc.
Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 224 ON READER SERVICE CARD

The Grappler+ Features:
• Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III Compatible* • Graphics Screen Dump • Inverse Graphics • Emphasized Graphics • Double Size Picture • 90° Rotation • Center Graphics • Chart Recorder Mode • Block Graphics • Bell Control • Skip-over-perf • Left and Right Margins • Variable Line Length • Text Screen Dumps.

The Grappler+ also works with Pascal and CPM.

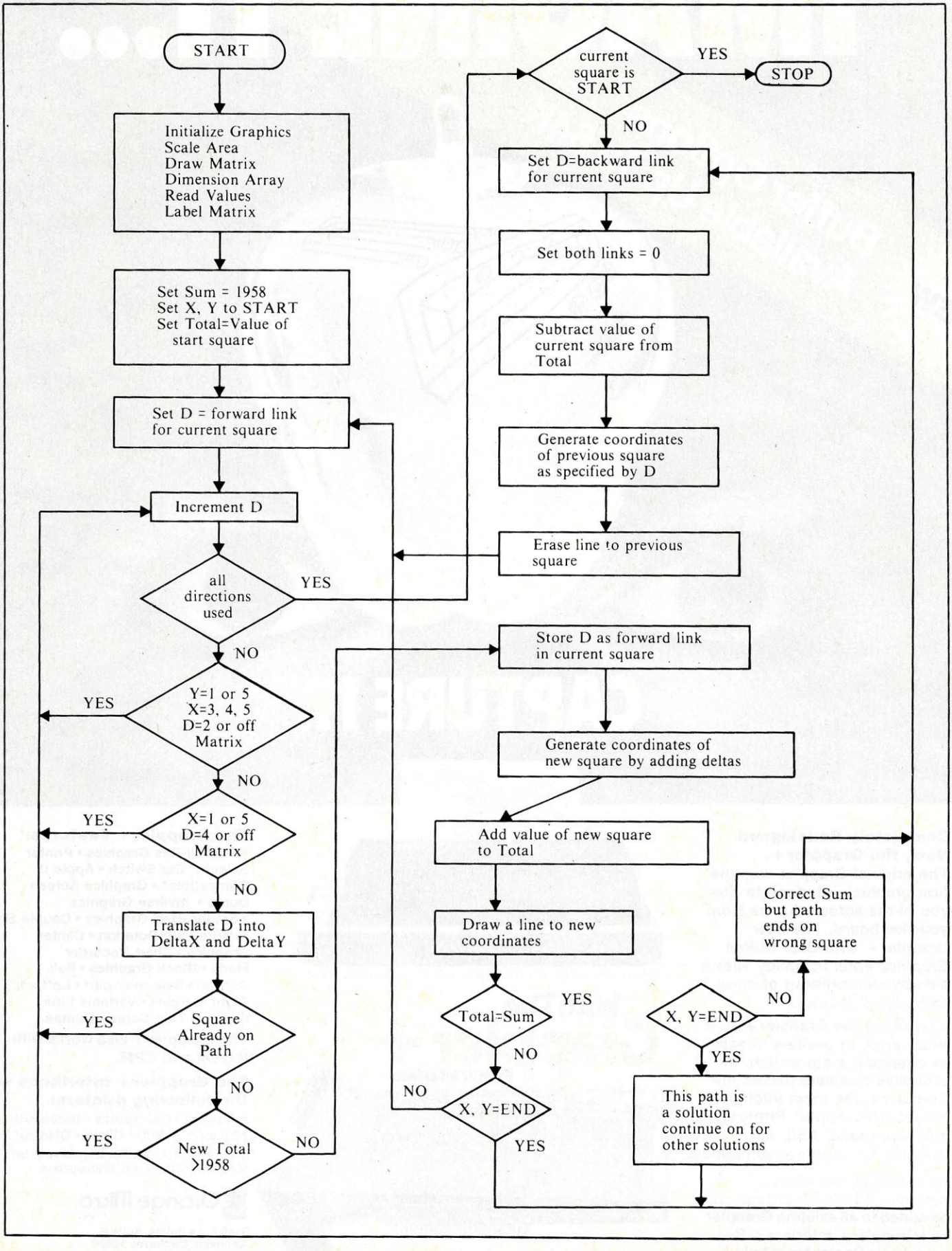
The Grappler+ interfaces with the following printers:
• Anadex • Centronics • Datasouth • Epson** • NEC • C.Itoh • Okidata**

The original Grappler is available for IDS 460, 560, Prism, Microprism.

Orange Micro Inc.
3150 E. La Palma, Suite G
Anaheim, California 92806
U.S.A.
(714) 630-3620
Telex: 183511 CSMA
Foreign Dealer Inquiries Welcome

Linked Lists, continued...

Figure 12.



CHRISTMAS SEASON SPECIALS!

Let ARK COMPUTING Make This Your Best Christmas Ever!

Super Fan II by R.H. Electronics **59.95/79.95**

Applicard, a high performance Z-80 card with 64K Ram, complete with CP/M
4 mhz **324.95**/445.00
6 mhz **395.00**/595.00

Microsoft Z-80 card with CP/M and Microsoft Basic
2 mhz **269.95**/395.00

Microtek Parallel Printer Interface complete with centronic compatible connector
64.95/79.95

Lazer Lower Case +Plus with Character Set +Plus **49.95**/84.90
Lower Case +Plus alone **39.95**/59.95

Lazer Graphics +Plus **99.95**/159.95
Graphics +Plus and Lower Case +Plus **134.95**/219.90

Computer Stop 16K Ram Board **69.95**/149.95

Computer Stop Omnivision 80 Column board **129.95**/295.00

Videx Video-term with softswitch, inverse character set and 80 column Visicalc preboot **295.00**/450.00

Wizard BPO 16K buffered printer interface (expandable to 32K) **134.95**/179.95

Wizard 80, 80 column board **195.00**/295.00

Lazer Pascal **29.95**/39.95

Anix 1.0 **34.95**/49.95

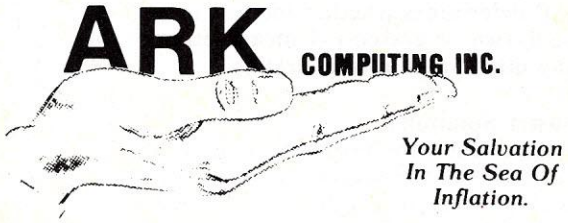
Lazer Forth **44.95**/59.95

D Tack 68000 board for the Apple II with 4K Ram **895.00**

Lazer Model/32 (16032 board for the Apple II) **CALL!**

CIRCLE 114 ON READER SERVICE CARD

Lisa	**59.95**/79.95
Lisa Educational Pak	**79.95**/119.95
Alien Ambush	**19.95**/29.95
Bandits	**19.95**/29.95
Cannonball Blitz	**24.95**/34.95
County Fair	**19.95**/29.95
Cranston Manor	**24.95**/34.95
Cyclod	**19.95**/29.95
David's Midnight Magic	**24.95**/34.95
Dosource 3.3	**24.95**/39.95
Dueling Digits	**19.95**/29.95
Falcons	**21.95**/29.95
Firebird	**21.95**/29.95
Foosball	**19.95**/29.95
Horizon V	**25.95**/34.95
Genetic Drift	**19.95**/29.95
Kabul Spy	**24.95**/34.95
Jelly Fish	**19.95**/29.95
Lemmings	**19.95**/29.95
Labyrinth	**19.95**/29.95
Mouskattack	**24.95**/34.95
Outpost	**19.95**/29.95
Red Alert	**19.95**/29.95
Pig Pen	**24.95**/34.95
Russki Duck	**25.95**/34.95
Minator	**24.95**/34.95
Track Attack	**19.95**/29.95
Thief	**17.95**/29.95
Space Quarks	**19.95**/29.95
Snack Attack	**19.95**/29.95
Swash Buckler	**24.95**/34.95
Gin Rummy	**24.95**/34.95
The Dictionary	**69.95**/99.95
General Manager	**99.95**/149.95
4 Ft. Disk Cable	**19.95**/29.95
Visicalc	**179.95**/250.00
Using 6502 Assembly Language Book	**14.95**/19.95
Kids and The Apple Computer Book	**15.95**/19.95
Apple Panic	**19.95**/29.95
Kraft Joystick	**49.95**/69.95



714 735-2250
P.O. Box 2025
Corona, CA 91720

Packard 9845B which has really super graphics, but you don't need anything too super to perform most of the operations I discuss below.

By scaling my graphics area (.5, 5.5, .5, 5.5) and drawing the matrix with corners at (.5, .5), (.5, 5.5), (5.5, 5.5), and (5.5, .5), the centers of the squares occur at integer coordinates corresponding to the subscripts of my A array. (Figure 11.)

Initially I do a MOVE to the center of the START square. Then, after I decide which square to move to next, I do a DRAW to the new coordinates. If I arrive at a dead end and have to back up, I erase lines by doing a PEN –1 and a DRAW to the coordinates of the previous square. On my HP 9845B, PEN–1 means erase.

If your machine doesn't have a SCALE statement just MOVE and DRAW to 3*X,3*Y or 5*X,5*Y or whatever scale factor is necessary to get a reasonable size matrix and pathway.

Also if you don't have MOVE, DRAW commands you will want to write a little subroutine which lets you draw horizontal and vertical lines. The program in Listing 1, or some modification of it, ought to work on your machine. As shown it will run on a TRS-80 or the like. It only draws vertical and horizontal lines, but that's all you need for this application.

To do a MOVE, simply set XS equal to the x-coordinate of the starting point and YS equal to the y-coordinate.

To do a DRAW set XE equal to the x-coordinate of the end point and YE equal to the y-coordinate. Then do a GOSUB 1000.

The routine draws a line from XE, YE to XS, YS. Then it sets XS=XE and YS=YE so you can draw a line starting at the end of the last line without redefining the startpoint.

P determines whether the line is to be drawn or erased (–1 means erase, any other value means draw).

Faster Solutions

After I got the program running, I noticed that the search spent a great deal of time on paths that I knew wouldn't work. For example, once a square in column 1 or 5 is entered (sides) there is no way to get to the END square by going down (direction 4). Also when Row 1 or 5 is entered (top and bottom) and I'm in columns 3, 4 or 5, there is no way to get to the END square by going right (direction 2). Also the END square should be treated as a dead end.

I was able to avoid searching these paths by modifying a few lines of code in the routine which checks to see if the proposed direction is legal. By eliminating these paths I was able to speed up the search considerably.

Conclusion

Figure 12 and Listing 2 show my flowchart and program. If you rewrite it for your own machine be careful to undo all your steps completely as you travel backward from a dead end. It is very easy to forget something. It took me a while to figure out that I was forgetting to subtract the values of the squares as I left them.

There are several solutions which result in a total of 1958, but only four

Listing 1.

```
1000  XI=SGN(XE-XS):YI=SGN(YE-YS)
1010  IF YI=0 OR XI=0 THEN 1100
1030  PRINT "ROUTINE ONLY DRAWS HORIZONTAL OR VERTICAL LINES"
1040  RETURN
1100  FOR I=0 TO ABS(XE-XS+YE-YS)
1110  IF P=1 THEN SET (XS,YS) ELSE RESET (XS,YS)
1120  XS=XS+XI:YS=YS+YI:NEXT
1130  XS=XE:YS=YE:RETURN
```

Listing 2.

```
10    !   THIS PROGRAM SYSTEMATICALLY SEARCHES FOR A PATH
20    !   THROUGH A MATRIX OF NUMBERS SUCH THAT THE SUM OF
30    !   ALL NUMBERS ON THAT PATH IS EQUAL TO 1589
40    !
50    GRAPHICS
70    SCALE 0,5.5,0,5.5
80    !
90    !   DRAW MATRIX
100   FOR I=.5 TO 5.5
110   MOVE .5,I
120   DRAW 5.5,I
130   MOVE I,.5
140   DRAW I,5.5
150   NEXT I
160   !
170   OPTION BASE 1  ! THIS SETS THE LOWER LIMIT FOR ARRAY SUBSCRIPTS TO ONE
180   DIM A(5,5,3)
190   !
200   !   A(XCOORD,YCOORD,1) = VALUE FOR THAT SQUARE
210   !   A(XCOORD,YCOORD,2) = LINK FORWARD  TO THE NEXT SQUARE
220   !   A(XCOORD,YCOORD,3) = LINK BACKWARD TO THE PREVIOUS SQUARE
230   !   LINK = 0 : SQUARE NOT ON PATH
240   !   LINK = 1 : UP
250   !   LINK = 2 : RIGHT
260   !   LINK = 3 : LEFT
270   !   LINK = 4 : DOWN
280   !
290   Sum=1958              ! SET SUM FOR PATH
300   !
330   FOR I=1 TO 5
340   FOR J=1 TO 5
350   READ A(J,I,1)         ! ASSIGN VALUES TO THE SQUARES
355   A(J,I,2)=A(J,I,3)=0   ! AND SET LINKS TO 0
360   MOVE J+.125,I+.25     ! LABEL UPPER RIGHT CORNER OF EACH SQUARE WITH VALUE
370   LABEL A(J,I,1)
371   NEXT J
372   NEXT I
373   MOVE 1.75,.7
374   LABEL "START"
375   MOVE 1.75,5.3
376   LABEL "END"
390   DATA 139, 47, 56,387,  1
400   DATA 282, 57, 32,462, 78
410   DATA  83, 12, 91,609,125
420   DATA   8, 16,  7,216, 95
430   DATA  22,  5, 37,108,117
460   !
470   !   MOVE INTO "START" SQUARE
480   X=2
490   Y=1
500   MOVE X,Y
510   Total=A(X,Y,1)
520 Next_square:  D=A(X,Y,2)
530 Inc_direction:  D=D+1
540   IF D>4 THEN First_square ! HAVE ALL DIRECTIONS BEEN EXHAUSTED
560   IF (Y=1) AND ((D=4) OR (D=3) AND (X>2)) THEN Inc_direction! OFF BOTTOM OF
MATRIX
570   IF (X=5) AND ((D=2) OR (D=4)) THEN Inc_direction! OFF RIGHT
580   IF (X=1) AND ((D=3) OR (D=4)) THEN Inc_direction! OFF LEFT
590   IF (Y=5) AND ((D=1) OR (D=2) AND (X>1)) THEN Inc_direction! OFF TOP
600   !
610   !   TRANSLATE D INTO DELTA X AND DELTA Y
620   Dx=Dy=0
```

which also terminate in the END square. I have shown one of the correct paths in Figure 13. Of course, there is nothing magic about 1958 or the values in the squares. Try different values and make your own puzzles. Try a three-dimensional matrix or different searching schemes.

Singly and doubly linked lists, aside from being buzz words, can be very useful in solving many types of problems, like this one, that involve searching large amounts of data. □

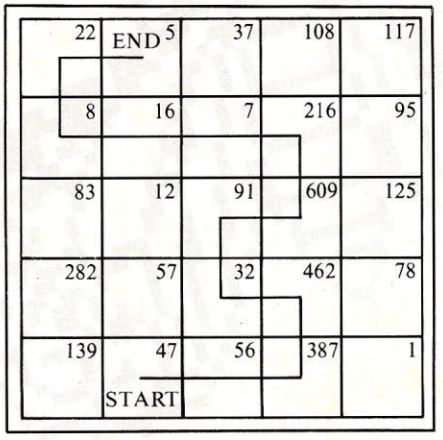


Figure 13.

```
630   IF D=1 THEN Dy=1
640   IF D=2 THEN Dx=1
650   IF D=3 THEN Dx=-1
660   IF D=4 THEN Dy=-1
670   !
680   IF A(X+Dx,Y+Dy,2)<>0 THEN Inc_direction ! IS NEW SQUARE ALREADY ON PATH
700   IF Total+A(X+Dx,Y+Dy,1)>Sum THEN Inc_direction         ! IS NEW TOTAL TOO
BIG?
710   A(X,Y,2)=D     ! STORE FORWARD LINK
720   X=X+Dx         ! UPDATE COORDINATES
730   Y=Y+Dy
740   A(X,Y,3)=5-D   ! STORE BACKWARD LINK AT NEW SQUARE
750   Total=Total+A(X,Y,1) ! SAVE NEW TOTAL
760 Line:  PEN 1     ! DRAW LINE TO NEW SQUARE
770   DRAW X,Y
780   IF (Total<>Sum) AND ((X<>2) OR (Y<>5)) THEN Next_square! NOT DONE YET
781   IF (Total<>Sum) AND (X=2) AND (Y=5) THEN Previous_sqr  ! END MUST BE LAST
782   IF (Total=Sum) AND (X=2) AND (Y=5) THEN Winner         ! WINNER
800   PRINT "CORRECT SUM FOUND ON THIS PATH BUT END SQUARE IS WRONG"
810   GOTO Previous_sqr  ! CONTINUE ON FOR OTHER PATHS
830   !
840   !
850 First_square:IF (X=2) AND (Y=1) THEN Done ! CHECK TO SEE IF DONE
860 Previous_sqr:D=A(X,Y,3)
870   A(X,Y,2)=0           ! SET LINKS BACK TO 0 SINCE I'M LEAVING THIS SQUARE
880   A(X,Y,3)=0
890   Total=Total-A(X,Y,1) ! SUBTRACT VALUE OF THIS SQUARE
900   IF D=1 THEN Y=Y+1
910   IF D=2 THEN X=X+1
920   IF D=3 THEN X=X-1
930   IF D=4 THEN Y=Y-1
940   PEN -1       ! ERASE THE LINE
950   DRAW X,Y
960   GOTO Next_square    ! GO TRY ANOTHER DIRECTION
970 Winner:    PRINT "THE CURRENT PATH IS A WINNER"
971   PRINT "PRESS CONTINUE TO CONTINUE"
972   PAUSE
980   GOTO Previous_sqr !TRY TO FIND OTHER PATHS
990 Done:  ! ALL PATHS HAVE BEEN TRIED
1000  PRINT "I HAVE FINISHED SEARCHING ALL PATHS"
1010  END
```


MTG TECHNICAL SALES

ATARI Special of the Month

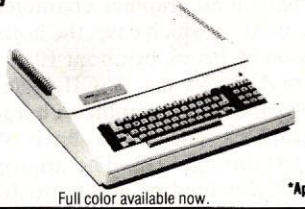
800 48k Now $659.

ATARI 810™ Disk Drive $429.

ATARI

NEW PERCOM Disk Drive for ATARI IN STOCK

FRANKLIN COMPUTER CORPORATION ACE1000



Full color available now.

Compatible with ALL APPLE II* Software & Hardware

STANDARD FEATURES
- 64K RAM
- UPPER & LOWER CASE
- 50 WATT PWR. SUPPLY
- NUMERIC KEYPAD
- ALPHA SHIFT LOCK
- BUILT IN FAN

*Apple II is a trademark of Apple Computer Co.

PRINTERS & PERIPHERALS

C. ITOH 8510 PROWRITER	$495
STARWRITER F-10	1449
SMITH CORONA TP-1	649
OKIDATA 82A	485
PERCOM 1st DRIVE	649
PERCOM 2nd DRIVE	375
SIGNALMAN MODEM	84
BOX 10 DISKETTES	20

CALL TOLL FREE 1-800-343-0854 FOR ORDERS ONLY

LOW, LOW SOFTWARE PRICES FOR ALL COMPUTERS

commodore VIC-20

OUR LOW PRICE $184

1525 PRINTER $339
1540 DISK DRIVE 365

OTHER VIC-20 PRICES ON REQUEST

WICO JOYSTICKS & TRACKBALLS ON SALE **CALL**

MTG Technical Sales
281 Needham St., Newton, MA 02164
Out of State 800-343-0854—
In MA 617-969-1799

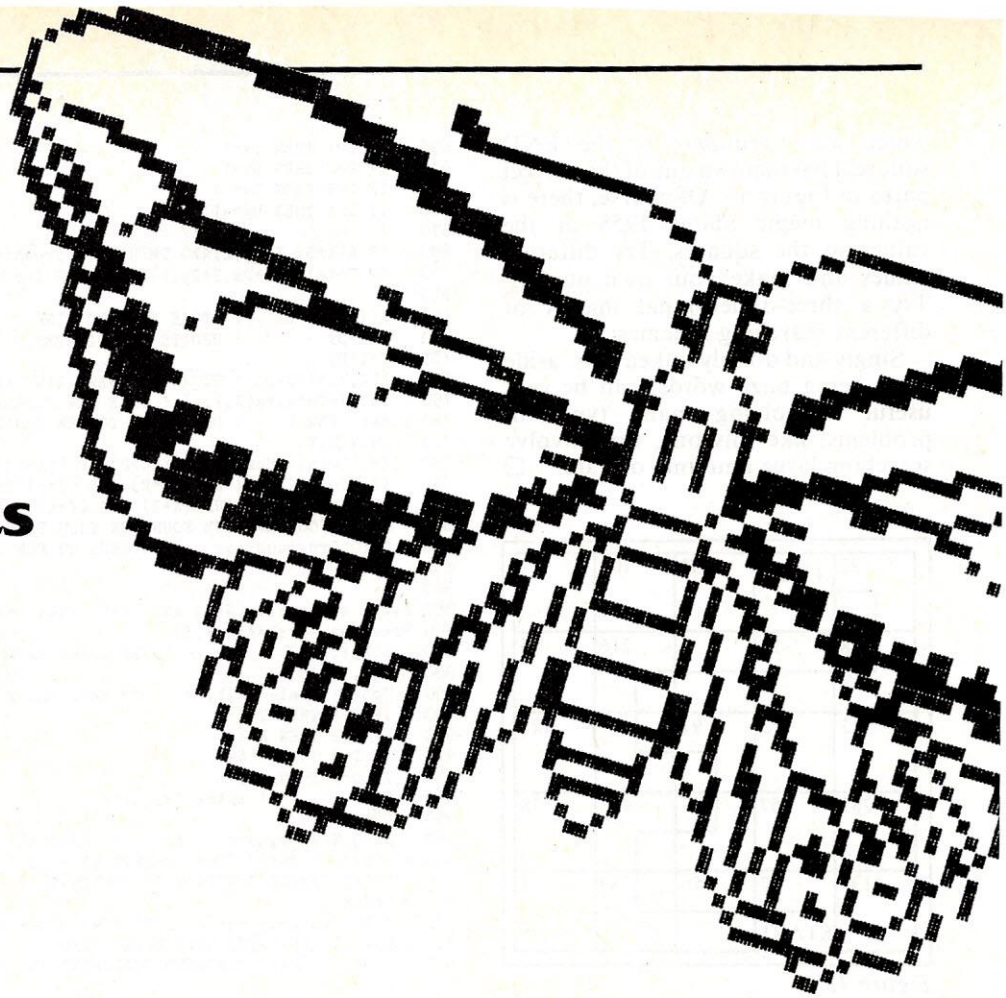
Do not send cash. Personal checks take two weeks to clear. Add 3% for MasterCard or VISA. Add shipping charges to all orders. We cannot ship to P.O. Box. Delivery subject to availability. Prices may change without notice. In-store prices may vary. Not responsible for typographical errors. Minimum charge for shipping and handling is $3.95.

IN STOCK ITEMS SHIPPED WITHIN 24 HOURS

WE MEET OR BEAT ANY CURRENTLY ADVERTISED PRICE. CALL FOR PRICES

CIRCLE 214 ON READER SERVICE CARD

MX-80 Graphics from Pascal



R. A. Dousette

The Epson MX-80 printer comes with a limited graphics capability. It has 64 graphics characters as shown in Figure 1. Better resolution graphics are available, but the cost for the hardware approaches $100.

I would like to have the ability to do graphics, but my need doesn't justify this expenditure. Fortunately, the graphics character set can be easily used from Apple Pascal to produce graphics that are adequate for my applications.

The Pascal graphics screen has a 192(down) by 280(across) resolution. Each MX-80 graphics character has a three (down) by two(across) resolution. Thus, if 66 lines of 80 graphics characters are printed on each page, the printed page will have a resolution of 198 by 160 dots.

In one dimension, the MX-80 will accommodate the graphics page. Going across, however, there isn't enough room to accommodate the graphics page.

The MX-80 accommodates four print sizes. They are normal size (80 characters per line), double-wide (40 characters per line), compressed (132 characters per line), and compressed double-wide (66 characters per line). By using these different print sizes, the page resolution can be changed. Double-width characters give a 198 x 80 display, compressed characters give a 198 x 264 display, and double-width compressed characters give a 198 x 132 display.

R. A. Dousette, 8283 Woodcrest Dr., Apt. 1, Westland, MI 48185.

Figure 1.

ASCII Codes Of Graphics Characters

160:	161:	162:	163:	164:	165:	166:	167:
168:	169:	170:	171:	172:	173:	174:	175:
176:	177:	178:	179:	180:	181:	182:	183:
184:	185:	186:	187:	188:	189:	190:	191:
192:	193:	194:	195:	196:	197:	198:	199:
200:	201:	202:	203:	204:	205:	206:	207:
208:	209:	210:	211:	212:	213:	214:	215:
216:	217:	218:	219:	220:	221:	222:	223:

Assignment Of ASCII Codes

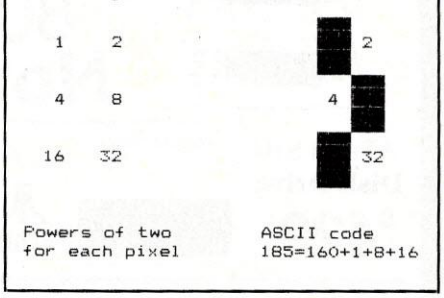


Figure 2.

Use of any of the resolutions causes some distortion of the image. The distortion is least if 80 graphics characters per line are used, in which case, the horizontal dimension is shrunk by about 10%.

Figure 1 shows the ASCII codes and the corresponding graphics characters. The graphics characters have ASCII codes 160 through 223. The appropriate code is determined by adding to 160 the appropriate power of two for each of the pixels to be printed. The example in Figure 2 shows how the ASCII code of 185 is assigned to one character.

Inviting!

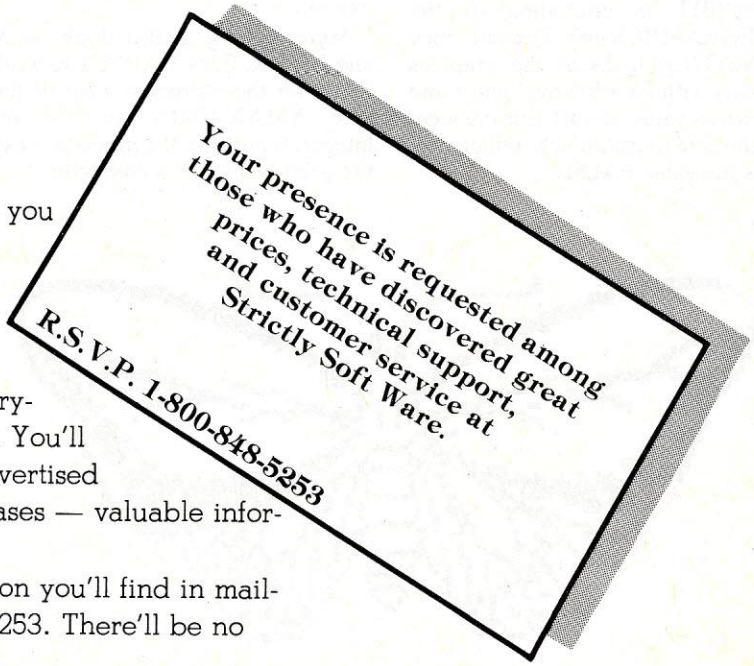
When the invitation arrives, you know immediately that things will be done in style.

That's the way people are thinking of **Strictly Soft Ware.**

We've issued an invitation for you to enjoy super prices, prompt delivery, and superior service.

When you're on the **Strictly Soft Ware** mailing list, you'll automatically receive our industry-leading catalog (Apple or IBM). You'll also receive news of sales, unadvertised specials, and new program releases — valuable information you can use.

So respond to the best invitation you'll find in mail-order software. Call 1-800-848-5253. There'll be no regrets.



Holiday Gift Idea #1

*The **Strictly Soft Ware** Subscription Plan. Prepayment allows the account to be drawn upon for whatever you want, whenever you want. When we send the package, we'll provide a balance statement as well. Here's a gift that can last all year long. Also ideal for large institutions.*

SPECIALS

Real Estate Analyzer	$134.95	Tigers in the Snow	$29.95
Word Handler	$149.95	David's Midnite Magic	$23.95
Money Muncher	$23.95	Temple of Apshai	$29.95
Pandora's Box	$23.95	Prisoner II	$29.95
Warp Destroyer	$23.95	Time Zone	$69.99

IBM • SPECIALS • IBM

Call to Arms	$25.99	Space Strike	$25.99
Apple Panic	$25.99	Deadline	$39.99
Snack Attack II	$25.99	Volkswriter	$159.99
Home Accountant	$119.99	Tax Manager	$199.99

Above Specials In Effect Until Jan. 1, 1983

Holiday Gift Idea #2

*The **Strictly Soft Ware** Gift Certificate. Here's the perfect way to take the guesswork out of holiday giving. A gift certificate and the **Strictly Soft Ware** holiday catalog guarantee the perfect gift for everyone on your holiday list.*

MasterCard VISA

We take Master Card or VISA (include card # and expiration date). Ohio residents add 5.5% tax. Include $2.50 for postage. 3% discount if check accompanies order.

Send for free catalog. Prices subject to change. Holiday Hours: 9-9:30 weekdays; 9-6 Sat.; 12-5 Sun.

Strictly Soft Ware
Post Office Box 338
Granville, Ohio 43023
order by phone **800-848-5253**
in Ohio **614-587-2938**

Apple is a registered trademark of Apple Computer, Inc.
IBM is a registered trademark of International Business Machines Corp.

CIRCLE 274 ON READER SERVICE CARD

I have written a Pascal procedure named DRAW that transfers a portion of the graphics screen to the printer. The procedure accepts four integer arguments, XMIN, XMAX, YMIN, and YMAX, that define a window into the graphics screen. This procedure has an internal procedure, SETCODE, that assigns the ASCII code for each block of six dots from the graphics screen by use of the Boolean function SCREENBIT.

SCREENBIT is contained in the TURTLEGRAPHICS unit. The reference SCREENBIT(I,J) looks at the graphics screen pixel with coordinates I and J and then returns a value of TRUE if the location on the screen isn't black. Otherwise, it returns the value FALSE.

By examining a 2 x 3 matrix of screen pixels, it is possible to determine the ASCII code of the graphics character that reproduces the pattern on the graphics screen.

Procedure DRAW initially sets a Boolean variable GRAFERROR as FALSE. Then, it tests the coordinates of the screen window for consistency. If the coordinates aren't correct, GRAFERROR is set at TRUE and the procedure is exited.

Some editing is also done on XMIN and XMAX. For CHARSET to work correctly on the rightmost edge of the picture, XMAX-XMIN must be an odd integer. If not odd, the procedure expands the window by half a character.

The procedure assumes normal width characters. No provision for double-width characters is made. Possible changes in the procedure include adding double-width characters and rotating the image through 90 degrees before printing it.

The program Printdemo demonstrates the use of this procedure. I borrowed the butterfly from the APPLE3:GRAFDEMO program that comes with the Language System. The program prints the butterflies in both normal (Figure 3) and compressed (Figure 4) formats.

I also drew two geometric figures by rotating a square (Figure 5) and, in the last case, expanding the square (Figure 6) as it rotates.

The GRAFRANDOM procedure illu-

Figure 3.

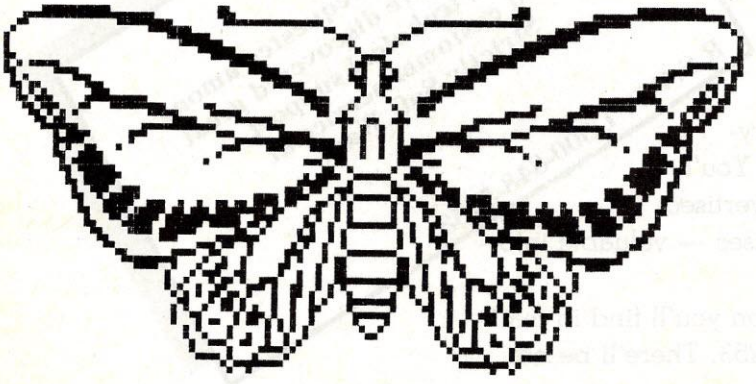


Figure 4.

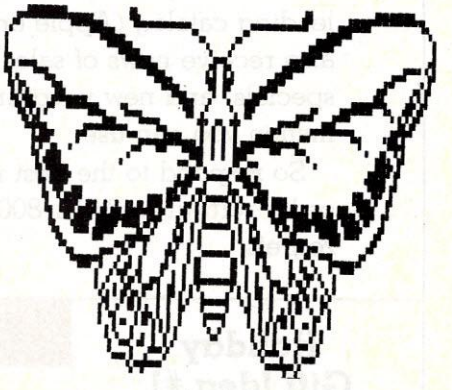


Figure 5.

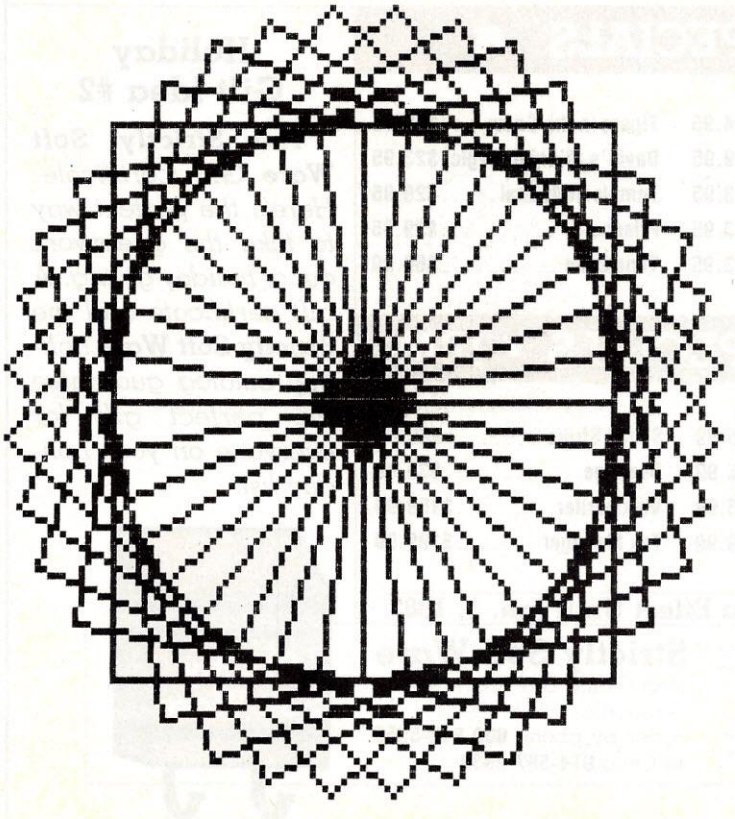
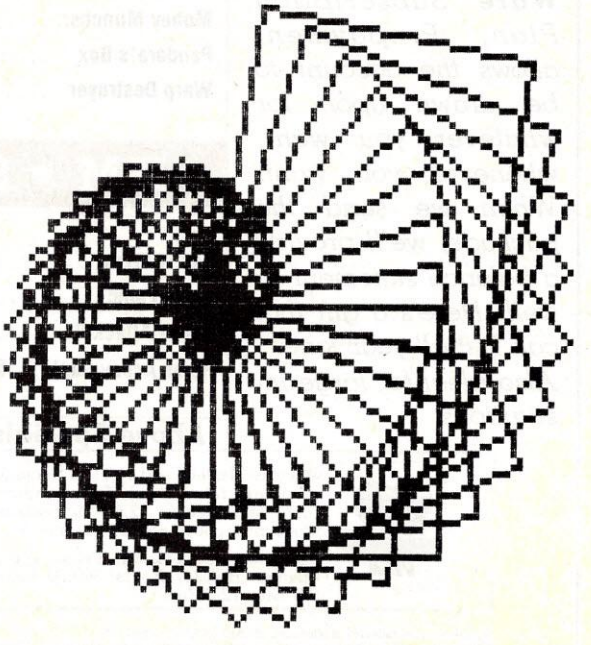


Figure 6.



MOVING SALE!

on apple® software

WE'VE MOVED TO THE STATE OF WASHINGTON!

And, we're celebrating with Special Discount Prices!

IMPORTANT: You must mention this ad or send it with order to receive advertised price!

OVER 1,000 ITEMS IN STOCK

STOCK ITEMS SHIPPED SAME DAY

micro mountain

Great News for Californians!

ORDER TOLL FREE (800) 854-5649

AND... SAVE ADDITIONAL 6% (NO SALES TAX)

This is the same Watts number the rest of the world has been using for ages.
If you live in Washington State or need customer assistance call direct — **(206) 483-2000.**

SILICON VALLEY SYSTEMS **Word Handler**	$149.50
KENSINGTON MICROWARE **System Saver**	$65.50
PROMETHEUS **16K RAM Card**	$69.50
COMPUTER APPLICATIONS **Nibbles Away**	$49.50
PENGUIN **Complete Graphics System II**	$54.50
D.C. HAYES SOFTWARE **Micro Modem II**	$289.50
BRODERBUND **Arcade Machine**	$35.50
ONLINE SYSTEMS **Sreen Writer II**	$95.50
EDU-WARE **Prisoner II**	$20.50
A2D **2001 Joystick**	$35.50
VISICORP **Visicalc 3.3**	$195.50

ASK FOR FREE CATALOG

DEDUCT 3% if payment accompanies order. ADD $2.00 (surface) SHIPPING & HANDLING. INCLUDE AN ADDITIONAL $3.50 for BLUE LABEL (air). WASHINGTON RESIDENTS ADD 6½% SALES TAX. We accept MASTER CARD and VISA. C.O.D.'s ADD $5.00.

NAME_____

STREET_____

CITY_____ STATE & ZIP _____

CARD # _____ EXP. DATE _____

SIGNATURE _____

14617 N.E. 169th ST., WOODINVILLE, WA 98072
ORDER PHONE—Outside Wash.—(800) 854-5649
Wash. Residents & Cust. Service (206) 483-2000

PRICES SUBJECT TO CHANGE WITHOUT NOTICE — PRICES ON AD EXPIRE DECEMBER 31, 1982

CIRCLE 207 ON READER SERVICE CARD

FREE ATARI
A Warner Communications Company

Complete catalog with hundreds of business & personal programs from SYNAPSE, AVALON HILL, STRATEGIC SIMULATIONS, DATA SOFT, BRODERBUND, SWIFTY SOFTWARE, INC., SWIFTWARE, K-BYTE, ON-LINE, SIRIUS, and EPYX for the ATARI Computer...FREE.

— CALL —

Kelly's Computing

TOLL FREE 1-800-572-9215
Calif. Residents (714) 369-8113

MISSLE COMMAND.....
SPACE INVADERS..... **27.50 ea.**
ASTEROIDS.....

PAC-MAN.....
CENTIPEDE..... **35.50 ea.**
CAVERNS OF MARS.....

FROGGER..... 34.95 *Now* **29.50**

CHOP LIFTER.... 34.95 *Now* **29.50**

ADVENTURES 1-12 (Gold Edition)
Disk & Cass (WHILE THEY LAST)
..... 100.00 *Now* **87.50**

STAR RAIDERS... 49.95 *Now* **33.50**

MEGALEGS (WHILE THEY LAST)
D&C..... 34.95 *Now* **24.99**

400 & 800 RAM BOARDS
32k..... 199.00 *Now* **75.00**
48k..... 299.00 *Now* **149.00**

COUPON
$2.00 OFF ORDER
To redeem, place a mail order for $75.00 or more and include this coupon. OFFER EXPIRES MARCH 31, 1983.

★ Write to: 3515 Bryce Way, Riverside, CA 92506 ★

WE PAY SHIPPING on software orders OVER $75 in the Continental U.S. (Foreign & Air extra). ADD $2.50 SHIPPING & HANDLING on orders under $75. **CALIF. RESIDENTS ADD 6% SALES TAX.** We accept **MASTER CARD** and **VISA.** C.O.D.'s ADD $5.00.

NAME_____
STREET _____
CITY _____ STATE & ZIP _____
CARD # _____ EXP. DATE _____
SIGNATURE _____
CHECK HERE FOR FREE CATALOG _____

CIRCLE 310 ON READER SERVICE CARD

MX-80 Graphics, continued...

strates a random walk (Figure 7). It can be interpreted as the result of a coin toss experiment; with each successive toss of the coin, the total count of heads is divided by the number of tosses and the resulting ratio is plotted. The horizontal line through the graph is the 50% level. As the number of coin tosses increases, the ratio tends towards 50% (Figure 8).

The resulting graphics aren't as pretty as those from Graftrax-80, and they lose all shading because colors other than black are treated the same. They are, however, adequate for what I want, and they have the enormous consolation of being free. □

Figure 7.

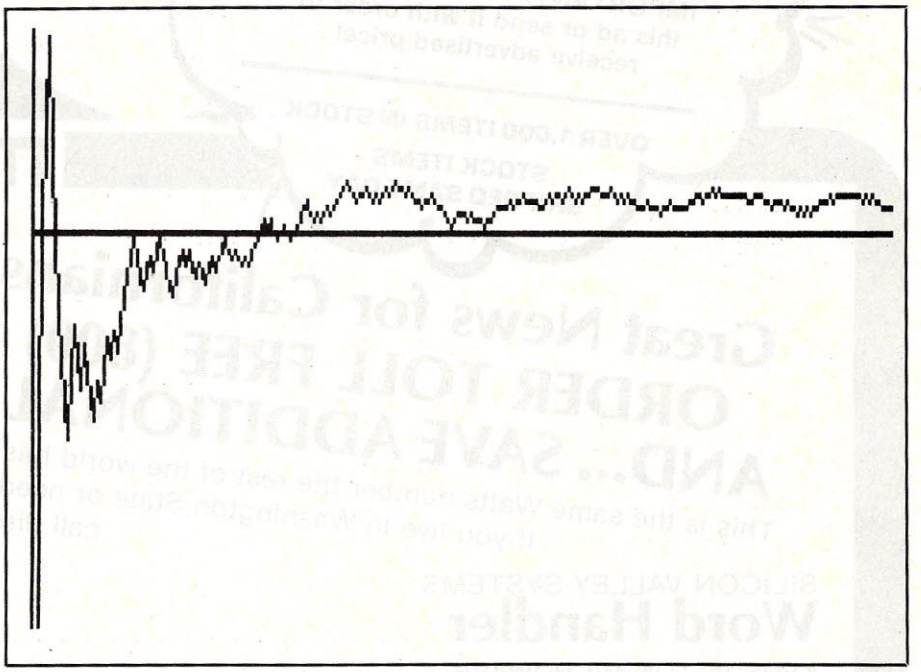
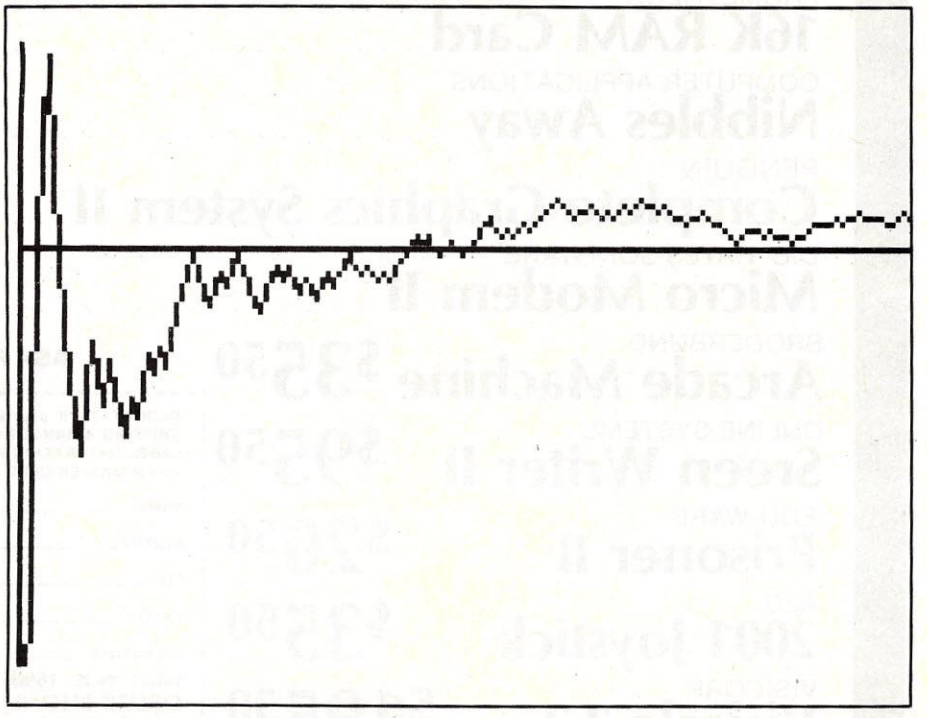


Figure 8.



Get Omni quality for as little as $1.99... even if all you want is a 10 pack.

Call toll-free for great savings on Omni's complete line of 5¼" and 8" premium disks. Each is certified error-free at a minimum of twice the error threshold of your system. Each is rated for more than 12 million passes without disk-related errors or significant wear. And each is precision fabricated to exceed all ANSI specifications with such standard features as reinforced hub rings and Tyvec sleeves. Get same day shipment and an unconditional, no hassle money-back guarantee.

ARCHIVE

152 Boston Turnpike
Shrewsbury, MA 01545
(800) 343-0314; In Mass:
(617) 756-2960

Call toll free
(800) 343-0314
In Mass: (617) 756-2960

Call if you're not sure which disk is compatible with your system. Call for prices on 96 tpi and special formats. We offer an unconditional money-back warranty. We're here to help.

Be sure to indicate system/drive name and model # at right.

	5¼" disks Cost per 10 pack	Quantity	8" disks Cost per 10 pack	Quantity	Total Cost
Single side/single density	$19.90	_____	$24.90	_____	$_____
Single side/double density	$23.90	_____	$31.90	_____	$_____
Double side/single density	——	_____	$34.90	_____	$_____
Double side/double density	$37.50	_____	$37.50	_____	$_____
Flip/Floppy reversible	$39.90	_____	$39.90	_____	$_____
Plastic library case (in lieu of soft storage box)	$ 2.99	_____	$ 3.49	_____	$_____
Shipping and handling ($2.00 first 10 pack, 40¢ additional 10 packs. Continental U.S. only.)					$_____
5% sales tax (Mass only)					$_____
				Total	$_____

☐ Check ☐ Master Card
☐ COD ☐ VISA

Card # _____ Exp. _____

System/drive model # _____

Name _____

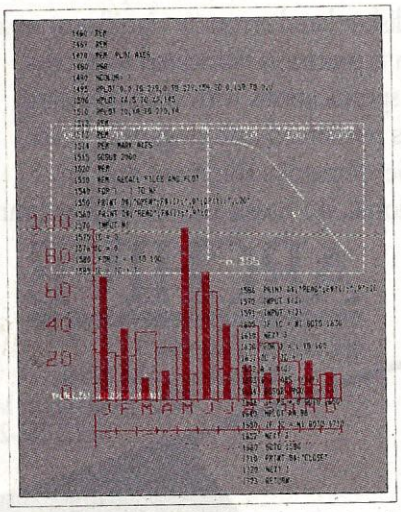
Address _____

_____

Tel. _____

CIRCLE 113 ON READER SERVICE CARD

DATA PLOTTING SOFTWARE FOR MICROS



21 Programs
Fully Documented, Copyable
BASIC Listings
Apple II and IBMpc

PIE CHARTS • BAR CHARTS
STOCK MARKET CHARTS
3D SURFACES • HISTOGRAMS
LOG PLOTS • CURVE FITTING
REGRESSION ANALYSIS
DATA MANAGEMENT
STATISTICAL ANALYSIS
TEXT ON GRAPHICS

All programs listed in Applesoft BASIC in a 248 pg book with theory, equations, full explanation of how they work. Modular and menu driven. Use as is, modify and combine for your own applications, or use as building blocks to develop your own programs. Optional 5¼" disks of listings availble for Apple II+ DOS3.3 48K and IBMpc DOS1.1 48K. This is your best buy in data plotting software!
Book: $28.50 **Disk:** $19.95

ALSO AVAILABLE

Graphic Software for Micros: a self-teaching guide to writing 2D and 3D graphics software-61 programs-*"..the best book available on micro graphics.."*-Creative Computing 2/82.
Book: $21.95 **Disk:** $19.95

Engineering Software for Micros: 25 programs for CAD, Fourier analysis, optimization, etc.
Book: $28.50 **Disk:** $19.95

Structural Analaysis Software for Micros: 14 programs-2D,3D trusses, frames & more.
Book: $39.95 **Disk:** $24.95

KERN PUBLICATIONS

Send check, money order, **VISA/MASTERCARD** no with exp date to 190 Duck Hill Rd, PO Box 1029, Duxbury, MA 02332. Add $2 per book postage in US, $3 UPS, $4 Canada, $12 air Europe and Central America, $18 elsewhere. Specify Apple or IBM with disk orders.

For faster delivery call (617)934-0445

CIRCLE 301 ON READER SERVICE CARD

MX-80 Graphics, continued...

```
PROGRAM PRINTDEMO;
(*****************************************************************)
(*                                                               *)
(*  THIS IS A PROGRAM TO DEMONSTRATE THE USE OF THE              *)
(*  EPSON MX-80 GRAPHICS CHARACTERS AND THE GRAPHICS             *)
(*  PAGE.                                                        *)
(*                                                               *)
(*****************************************************************)

USES TURTLEGRAPHICS,APPLESTUFF;
CONST XMAX=279;
      YMAX=191;
      XMID=140;
      YMID=96;

TYPE PICTURE=PACKED ARRAY[0..53,0..120] OF BOOLEAN;

VAR I,J,K,SKIP,ROW: INTEGER;
    CH: CHAR;
    PRINTER:TEXT;
    BUTTER: PICTURE;
    GRAFERROR,BIT: BOOLEAN;
PROCEDURE WAIT(TIME:INTEGER);
VAR DELAY: INTEGER;
BEGIN
  FOR DELAY:=1 TO TIME DO;
END;
PROCEDURE DRAW(XMIN,XMAX,YMIN,YMAX:INTEGER); { Transfer a portion of }
                        { the graphics screen to the printer.  Use   }
CONST NEXTFORM=140;     { coordinates XMIN, XMAX, YMIN, YMAX to set  }
      COMPCHAR=15;      { the window to the screen.                  }
      NORMCHAR=146;

  VAR GRAFCODE,XORD,YORD:INTEGER;

  PROCEDURE SETCODE(XPOS,YPOS:INTEGER); { Determine ASCII code of }
    VAR I,J,XTOP,YBOT,CHARSET:INTEGER;  { six positions from the  }
      BEGIN                             { graphics screen.        }
        CHARSET:=1;
        GRAFCODE:=160;
        XTOP:=XPOS+1;
        IF XTOP>XMAX THEN XTOP:=XMAX;
        YBOT:=YPOS-2;
        IF YBOT<YMIN THEN YBOT:=YMIN;
        FOR J:=YPOS DOWNTO YBOT DO
          FOR I:=XPOS TO XTOP DO
            BEGIN
              IF SCREENBIT(I,J) THEN GRAFCODE:=GRAFCODE+CHARSET;
              CHARSET:=2*CHARSET
            END;
      END;
  BEGIN
    GRAFERROR:=FALSE;
    IF NOT ODD(XMAX-XMIN) THEN          { Procedure SETCODE needs an even }
       IF XMAX<279 THEN  XMAX:=XMAX+1 { number of x ordinates to corr-  }
                   ELSE  XMIN:=XMIN-1;{ set the character.              }
    IF ((XMAX-XMIN>263) OR (XMAX>279) OR (XMIN<0) OR (XMIN>XMAX)
       OR (YMIN<0) OR (YMAX>191) OR (YMIN>YMAX)) THEN
        BEGIN
          GRAFERROR:=TRUE;
          EXIT(DRAW)
        END;
    IF XMAX-XMIN>159 THEN WRITE(PRINTER,CHR(COMPCHAR))
                     ELSE WRITE(PRINTER,CHR(NORMCHAR));
    YORD:=YMAX;
    REPEAT
      XORD:=XMIN;
      REPEAT
        SETCODE(XORD,YORD);
        WRITE(PRINTER,CHR(GRAFCODE));
        XORD:=XORD+2;
      UNTIL XORD>XMAX;
      WRITE(PRINTER,CHR(10));
      YORD:=YORD-3;
    UNTIL YORD<YMIN;
    WRITE(PRINTER,CHR(NEXTFORM))
  END;

PROCEDURE FRAME;
BEGIN
  PENCOLOR(NONE); MOVETO(0,0);
  PENCOLOR(WHITE);
  MOVETO(0,YMAX); MOVETO(XMAX,YMAX);
  MOVETO(XMAX,0); MOVETO(0,0);
  PENCOLOR(NONE);
END;
```

```
PROCEDURE ERASE;
BEGIN
  VIEWPORT(0,XMAX,0,YMAX);
  FRAME;
  VIEWPORT(1,XMAX-1,1,YMAX-1);
   FILLSCREEN(BLACK);
   PENCOLOR(NONE);
   MOVETO(XMID,YMID);
   PENCOLOR(WHITE)
END;

PROCEDURE GRAFRANDOM;
VAR YVAL:0..191;
    XVAL:0..279;
    RNDCOUNT:0..279;
BEGIN
  ERASE;
  PENCOLOR(NONE);
  MOVETO(XMAX,YMID);
  PENCOLOR(WHITE);
  MOVETO(0,YMID);
  RNDCOUNT:=0;
  FOR XVAL:=0 TO 279 DO
    BEGIN
      IF RANDOM>16384 THEN RNDCOUNT:=RNDCOUNT+1;
      YVAL:=RNDCOUNT*191 DIV (XVAL+1);
      MOVETO(XVAL,YVAL)
    END;
END;


PROCEDURE DRAWSQUARE(I:INTEGER);
VAR J:1..4;
BEGIN
  FOR J:=1 TO 4 DO
    BEGIN
      MOVE(I);
      TURN(90)
    END
END;
```


Command Strategy Football

An exciting 2-player game that lets YOU BE THE COACH!

Easy for beginners and challenging for veteran armchair quarterbacks!

JUST $34.95 complete

Allow 3 weeks for delivery.

Comes complete with instruction book. Programmed for **APPLE II** and **APPLE II+** computer with 48K Ram FP.

Make check or money order payable to: **RANCO SOFTWARE GAMES, INC.** 4 Bartlett Ave., Roanoke, Al. 36274. For faster service on orders only call: **[205] 863-4718.**
Master Charge or Visa accepted. Please give card number and expiration date.

Ranco Software Games, Inc.
No. 4 Bartlett Ave.
Roanoke, AL 36274

*Apple is the trademark of the Apple Computer Corp.

CIRCLE 244 ON READER SERVICE CARD

Experience the Magazines of the Future . . . TODAY

MAGATARI™ *for the Atari 400/800*

TRC™ *for the TRS-80 COLOR, Ext. Basic*

appletree™ *for the APPLE II+*

The Programmer's Institute's magnetic magazines will entertain, educate, and challenge you.

Each issue features ready-to-load programs ranging from games, adventures, home applications and utilities to personal finance, educational, and our unique teaching programs. Our magazines include fully listable programs, a newsletter containing descriptions and instructions for all programs, and notes on programming techniques used.

"Received my first copy . . . it's great! Please rush to me one of each back issue, so I'll have a complete set."
R.G., Chicago, IL

"Not only are the games fun and the applications useful, but the quality of the programs is excellent."
S.P., Midwest Computer Software Sales

COMING SOON: VicVideo for the Vic-20 and PCM magazine for the IBM personal computer.
Plus Educational Software for the Atari 400/800.

ORDERING INFORMATION

Subscriptions*	Cassette	Diskette
Year	$50.00	$75.00
½ Year	$30.00	$45.00
Trial Issue	$10.00	$15.00

*** Add $2.00 postage and handling.**
ALL SOFTWARE REQUIRES 16K.
Note: Appletree is available only on diskette.

See your local dealer or order direct:
THE PROGRAMMER'S INSTITUTE
a division of **FUTUREHOUSE**
P.O. BOX 3191, DEPT. A
CHAPEL HILL, NC 27514

VISA MasterCard

1-919-967-0861
10 AM - 9 PM, Mon - Sat

CIRCLE 237 ON READER SERVICE CARD

GAME DESIGNER
WHO SAYS YOU CAN'T
WE SAY YOU CAN
introducing
THE FROB™

The hardware/software system that converts your Apple® II into a *sophisticated Atari® VCS game development workstation.*

Five minutes to install
— • —
No machine modification
— • —
Operational simplicity
— • —
Real time game development

The Bottom Line: A Low Investment For Maximum Returns
ORDER NOW FOR IMMEDIATE DELIVERY.

CALL 408-429-1552
FROBCO, a Div. of
Tri-Comp Polytechnical, Inc.
P.O. Box 2780
Santa Cruz, CA 95063

The Miracle of Creation Can Be Yours

FROB is a trademark of **FROBCO.**
Atari and Apple are registered trademarks of Atari, Inc. and Apple Computers, Inc. respectively.

CIRCLE 227 ON READER SERVICE CARD

COTTAGE SOFTWARE

PACKER: Machine language program that edits all or part of your Basic program to run faster, save memory, or ease editing. The 5 options include UNPACK—unpacks multiple statement lines into single statements maintaining logic inserts spaces and renumbers lines. SHORT—deletes unnecessary words, spaces, and REM statements. PACK—packs lines into maximum multiple statement lines, maintaining program logic. RENUM—renumbers lines, including all branches. MOVE—moves line or blocks of lines to any new location in program. On 2 cassettes for 16K, 32K, & 48K. For TRS-80™ Mod I or III Level II or Disk Basic $29.95

SYSTEM TAPE DUPLICATOR: Copy your SYSTEM format tapes. Includes verify routines. The Model III version allows use of both 500 and 1500 baud cassette speeds.
For TRS-80™ Model I or III Level II $15.95

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes 50 peel-and-stick labels on tractor feed paper.
For TRS-80™ Model I or III Level II & Printer . $17.95

PRINT TO LPRINT TO PRINT: Edits your Basic program in seconds to change all Prints to LPrints (except Print@ or Print#) or LPrints to Prints. Save edited version.
For TRS-80™ Model I or III Level II $12.95

FAST SORTING ROUTINES: For use with Radio Shack's Accounts Receivable, Inventory Control I, and Disk Mailing List Systems for Model I Level II. Sorts in SECONDS! You'll be amazed at the time they can save. Supplied on data diskette with complete instructions.
FAST SORT for Accounts Receivable $19.95
FAST SORT for Inventory Control I $19.95
FAST SORT for Disk Mailing List (specify data diskette cassette for 1 drive system) $14.95
ALL THREE ROUTINES $44.95

Prices subject to change without notice. Call or write for complete catalog. Dealer inquiries invited. VISA and MasterCard accepted. Foreign orders in US currency only. Kansas residents add 3% sales tax.
On-line catalog on Wichita FORUM-80: 316-682-2113
Or call our 24 hour phone 316-683-4811 or write:
COTTAGE SOFTWARE
614 N. Harding Wichita, KS 67208
TRS-80 is a trademark of Tandy Corporation

CIRCLE 152 ON READER SERVICE CARD

MX-80 Graphics, continued...

```
PROCEDURE DRAWFAN;
VAR I:1..36;

BEGIN
  ERASE;
  FOR I:=1 TO 36 DO
    BEGIN
      DRAWSQUARE(40);
      TURN(10)
    END;
  WAIT(3000)
END;


PROCEDURE DRAWSPIRAL;
VAR I:1..36;

    J:9..44;
BEGIN
  ERASE;
  FOR I:=1 TO 36 DO
    BEGIN
      J:=I+8;
      DRAWSQUARE(J);
      TURN(10)
    END;
  WAIT(3000)
END;

PROCEDURE STUFF(VAR BITMAP: PICTURE; S:STRING);
(* MAKE BUTTERFLY BITMAP FORM STRINGS *)
VAR J: INTEGER;
BEGIN
  FOR J:=1 TO LENGTH(S) DO
    BEGIN
      BIT:=(S[J]<>' ');
      BITMAP[ROW,J+59]:=BIT;
      BITMAP[ROW,60-J]:=BIT; (* SYMMETRIC *)
    END;
  ROW:=ROW-1;
END;


PROCEDURE BUTTER1;
BEGIN
  ROW:=53;
STUFF(BUTTER,'                          XX                  XXXXXXXXXXX          ');
STUFF(BUTTER,'                         XXX              XXXXXXXXXXXXXXXXXXXX     ');
STUFF(BUTTER,'        XXXXXXXXXXXXXXXX        XXXXXXXXX                  XX     ');
STUFF(BUTTER,'      XX                      XXXXXXX                        X     ');
STUFF(BUTTER,'    XX                      XXXXXXX                          X     ');
STUFF(BUTTER,'   X                       XXXXXXX                           X     ');
STUFF(BUTTER,'  X                       XXXXXX                             X     ');
STUFF(BUTTER,'XX                      XXXXXXX                             XX    ');
STUFF(BUTTER,' XX                    XXXXXX                        ----- * X    ');
STUFF(BUTTER,' X X                 XXXXX                      ----      XX    ');
STUFF(BUTTER,' XXX               XXXXX                     ---        * X     ');
STUFF(BUTTER,' XX              XXXXX                     ---         ** XX     ');
STUFF(BUTTER,' X             XXXX                      ---          * * X     ');
STUFF(BUTTER,'  X     XXXX                          ----------      *** XX     ');
STUFF(BUTTER,'    X   XXX                  --      ---------  --    *** XX     ');
STUFF(BUTTER,'     X  XX              -----    -----             - * * XX      ');
STUFF(BUTTER,'X  XXX              ------      ----               ** XX         ');
END;


PROCEDURE BUTTER2;
BEGIN
STUFF(BUTTER,' X  X        ---       ------------          ******X             ');
STUFF(BUTTER,' X  X     -----      ---          ---       **** X              ');
STUFF(BUTTER,' X  X ----------------                     ***XX               ');
STUFF(BUTTER,' X  X-----    ---   ---                  -   **  * X            ');
STUFF(BUTTER,' X  X---            -                    ****  XX              ');
STUFF(BUTTER,'    X*  ---         -                    ***** X              ');
STUFF(BUTTER,'   X  **                               ******  XX             ');
STUFF(BUTTER,'XXX  XX** *                            ******  X              ');
STUFF(BUTTER,'   X   XX***                            ***** XX              ');
STUFF(BUTTER,'   XXI  XX ***                        ***  ***  X             ');
STUFF(BUTTER,'XXX X I   XX** ****                    ***** *  XX            ');
STUFF(BUTTER,'   X X II   XX **** ** **  *  *  ***   *****   X              ');
STUFF(BUTTER,'   X X  II    XX ******** *** ** ***** ****  XX              ');
STUFF(BUTTER,'   X X  I I    IXX*  ************ ***** **   X               ');
STUFF(BUTTER,'XXXX  X  II     I XX ***** ******  *****    XX               ');
STUFF(BUTTER,'    X X  I I     I  XX      ****** ****    XX               ');
END;
```

```
PROCEDURE BUTTER3;
BEGIN
STUFF(BUTTER,'     X X  III       IIIIXXX       ***          XX          ');
STUFF(BUTTER,'     X  X  I I       I  II XXX                XX          ');
STUFF(BUTTER,'XXXX   X    III      I     II  XXXX        XX             ');
STUFF(BUTTER,'     XX X    I I       I  O  I     XXXXXXXXX              ');
STUFF(BUTTER,'     XX  X     II      I  OO  I    X  XXXX                ');
STUFF(BUTTER,'     XX  X   I  I      II  OOO I    X                     ');
STUFF(BUTTER,'XXXXXX  X   I    III   I II O    I  X                     ');
STUFF(BUTTER,'     X X X  II   I III    II  O  I X                      ');
STUFF(BUTTER,'    X   X  X II   I    I OO II O I X                     ');
STUFF(BUTTER,'XXXX    X X   I   I     I OO I    IX                      ');
STUFF(BUTTER,'    X     XX  I   I  O I OO  I   I X                      ');
END;

PROCEDURE BUTTER4;
BEGIN
STUFF(BUTTER,'XXX        X  I   I OOO I      II  X                      ');
STUFF(BUTTER,'  X        X  I O I OO I  OO I   X                       ');
STUFF(BUTTER,' X          X I O I      I     I X                        ');
STUFF(BUTTER,'X           X  I  I  O   I    I  X                       ');
STUFF(BUTTER,'             X I  I  OO  III  X                          ');
STUFF(BUTTER,'              X IIII     I     X                          ');
STUFF(BUTTER,'               X    I    I XXXX                          ');
STUFF(BUTTER,'                XXXXXIII X                                ');
STUFF(BUTTER,'                     X  X                                 ');
STUFF(BUTTER,'                      XX                                  ');
END;


PROCEDURE INITBUTTERFLY;
BEGIN
  BUTTER1;
  BUTTER2;
  BUTTER3;
  BUTTER4;
END;

PROCEDURE FLUTTER;
BEGIN
  (* DRAW SIX BUTTERFLIES *)
  DRAWBLOCK(BUTTER,16,0,0,120,54,  10,   0,14);
  DRAWBLOCK(BUTTER,16,0,0,120,54,150,  64,14);
  DRAWBLOCK(BUTTER,16,0,0,120,54,  10,128,14);
  DRAWBLOCK(BUTTER,16,0,0,120,54,150,128,14);
  DRAWBLOCK(BUTTER,16,0,0,120,54,  10,  64,14);
  DRAWBLOCK(BUTTER,16,0,0,120,54,150,   0,14);
  WAIT(1000);
END;

PROCEDURE ERRORMESSAGE(ERRPOINT:INTEGER);
BEGIN
 IF GRAFERROR THEN
  CASE ERRPOINT OF
    1:WRITELN('SORRY- NO BUTTERFLIES');
    2:WRITELN('SORRY- NO COMPRESSED BUTTERFLIES');
    3:WRITELN('SORRY- NO FAN');
    4:WRITELN('SORRY- NO SPIRAL');
    5:WRITELN('SORRY- NO RANDOM WALK');
    6:WRITELN('SORRY- NO COMPRESSED RANDOM WALK');
  END;
END;

BEGIN
  RANDOMIZE;
  REWRITE(PRINTER,'PRINTER:');
  INITBUTTERFLY;
  INITTURTLE;
  FRAME;
  FLUTTER;
  DRAW(0,159,0,191);
  ERRORMESSAGE(1);
  DRAW(0,263,0,191);
  ERRORMESSAGE(2);
  DRAWFAN;
  DRAW(50,209,0,191);
  ERRORMESSAGE(3);
  DRAWSPIRAL;
  DRAW(60,219,0,191);
  ERRORMESSAGE(4);
  GRAFRANDOM;
  DRAW(0,159,0,191);
  ERRORMESSAGE(5);
  DRAW(0,263,0,191);
  ERRORMESSAGE(6);
END.
```

If you use a Word Processor, you need

GRAMMATIK

Beyond Spelling Checking

Grammatik can find **over 15 different** kinds of common errors missed by simple spelling checkers alone, including punctuation and capitalization errors, overworked and wordy phrases, and many others. Use Grammatik with Aspen Software's spelling checker Proofreader, featuring the Random House Dictionary®, or with your current spelling checker for a complete document proofreading system.

Read what the experts say:

"The perfect complement to a spelling checker."
Alan Miller, Interface Age, 5/82

"A surprisingly fast and easy tool for analyzing writing style and punctuation."
Bob Louden, InfoWorld, 12/81

"Anyone involved with word processing in any way is encouraged to get this excellent program."
A.A. Wicks, Computronics, 6/82

"A dynamic tool for comprehensive editing beyond spelling corrections."
Dona Z. Meilach, Interface Age, 5/82

"A worthy and useful addition to your word processing software."
Stephen Kimmel, Creative Computing, 6/82

Works with CP/M®, IBM-PC®, TRS-80®

Grammatik $75.00
Proofreader $50.00

Order directly from Aspen Software, or see your local dealer. Specify your computer system configuration when ordering! Visa, Mastercard accepted.

Random House is a registered trademark of Random House, Inc. Other registered trademarks: CP/M: Digital Research -- TRS-80: Tandy Corp. -- IBM: IBM -- Proofreader, Grammatik: Aspen Software Co.

Aspen Software Co.
P.O. Box 339-C Tijeras, NM 87059
(505) 281-1634

An IBM PC Character Generator

C. Kenneth Fan

The IBM PC character generator is a program for making your own characters. You can make up any number of characters, in sets of 127, and use them within your other programs. It allows you to make customized characters for special purposes, such as letters of the Greek or Cyrillic alphabets, and cursive or underlined characters.

You can also use it to make pictures that are one character in size or composites made up of many characters. There are as many applications as your imagination will allow.

You need an IBM Personal Computer, with preferably 96K or more RAM, a color graphics monitor adaptor, and BasicA.

Character Structure and Location

The progammable character set is possible because the IBM PC defines only the first 128 (0-127) characters in graphics mode. The rest of the characters are left to be designed by the user. The addresses of these characters are given at the locations 7C-7F hex.

Each character is formed in an area of 8 x 8 pixels. Each row of eight pixels (bits) forms one byte, so that every character is defined by eight bytes.

Figure 1 shows one example of a character and the bytes that define it. After its formation, the definition of the character is stored sequentially, as demonstrated in Figure 2.

Note that even though each character definition is eight bytes long, once it is located properly, it can be recalled by its assigned ASCII code (128-254), which is only one byte long.

C. Kenneth Fan, 4074 Koko Dr., Honolulu, HI 96816.

Making Characters

The screen display for the character generator shows four major sections. The second line of text displays the current memory location of the character set you are making or revising (in the format of segment: offset). The large 8 x 8 grid is where characters are actually designed. It represents the 8 x 8 pixels that make up the character space.

To its right, a box displays the ASCII codes of the characters in hexadecimal. The first digit of the code is given by the column heading, and the second digit by the row heading. The last section is the command table at the bottom of the screen.

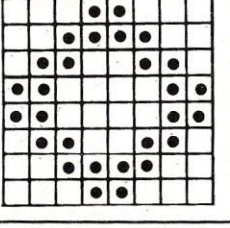
There is a total of 14 commands to help you design shapes. To use a command, simply type the first letter of that command. For example, if you wish to execute the command MEMORY, type the letter M. This first letter of the current command is shown to the lower left of the grid and remains until you change your command.

Before you begin to create shapes, be sure to indicate the memory location for the character set you want to make. To do this, use the MEMORY command, specifying the Segment and the Offset.

Be careful in using this command because doing so carelessly can "hang" the machine. (The CTRL-ALT-DELETE sequence may be inactivated.) Bad places to assign this location would be in the Basic work area (which could destroy the program), the system work area or BasicA program (both of which could "hang" the system), and the ROM (which would simply not let you create a character set). This is why it is recommended that you have 96K or more RAM.

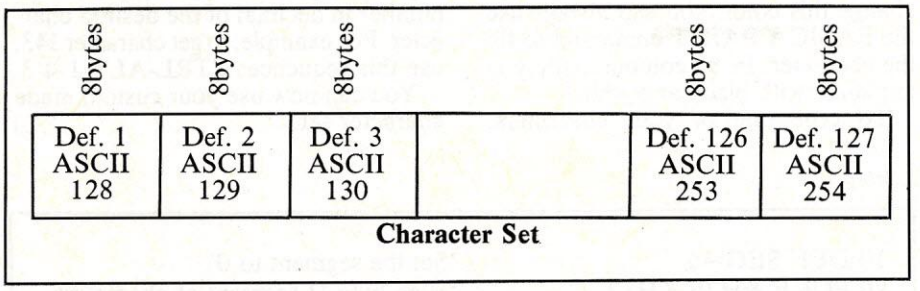
With less than 96K, you must find a safe place in the Basic work area that does not interfere with program variables, the program, or system variables.

Figure 1.



Graphic	Binary	Hex	Byte
	00011000	18	1
	00111100	3C	2
	01100110	66	3
	11000011	C3	4
	11000011	C3	5
	01100110	66	6
	00111100	3C	7
	00011000	18	8

Figure 2.



Once you have found a safe location, you must tell the computer by giving it the segment location and offset. If you wish, you may type in a hexadecimal number by preceding it with &H.

The first four commands are UP, DOWN, LEFT, and RIGHT. Execution of these commands moves the cross hair on the grid in the specified direction. If you move the cross hair off a side of the grid, it will simply wrap around to the opposite side.

The next two commands, PLOT and ERASE, allow you to draw the character on the grid. To put a point on the grid, move the cross hair to the desired pixel location and type P for PLOT. Your character now has a point in this position. If you decide you no longer need a point, move the cross hair to the point you wish to erase and type E for ERASE. The point will disappear.

When you are done making a shape, you store it as a character by using the FINISHED command (type F). The computer then asks for your ASCII code for the character. This code must be between 128 and 254 (&H80-&HFE). After you type this number, the computer pauses a moment and then displays your character in the character set in the box on the right in the position designated by your ASCII code. If you do not want to keep the character, you can clear the grid at any time by typing C for CLEAR.

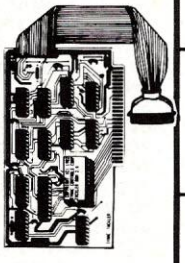
The GET command is the opposite of FINISHED. It takes a character from the character set and puts it into the grid. This can be used for revising an already existing character or for adding something (such as an underline) to it. When you execute the GET command, the computer asks for the ASCII code just as it does for the FINISHED command. It then asks whether you wish to merge the character or not. If you wish to merge (combine the character you asked for and the shape already in the grid), type Y.

The next four commands, ACCESS, SAVE, MEMORY, and NEW, affect the whole character set as opposed to a single character. The NEW command wipes out the character set. It CLEARs all characters from RAM, but not from disk. The MEMORY command is used to change the memory location of the character set, as described above.

The ACCESS and SAVE commands allow you to load from and save to disk respectively. The ACCESS command leads the character set under the specified filename at the current memory address. The SAVE command saves the current character set under the specified filename.

APPLE HARDWARE

THE TACKLER™ – DUAL • MODE PARALLEL INTERFACE FOR THE APPLE® 2 BOARDS IN ONE FOR NO MORE COMPATIBILITY PROBLEMS!

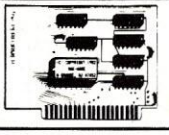


An intelligent board to provide easy control of your printer's full potential. Plus a standard parallel board at the flip of a switch – your assurance of compatibility with essentially all software for the APPLE®. Hires printing with simple keyboard commands that replace hard to use software routines. No disks to load. Special features include inverse, doubled, and rotated graphics and many text control features, available through easy keyboard or software commands. Uses Industry standard graphics commands. This is the first truly universal intelligent parallel interface! Change printers – no need to buy another board. Just plug in one of our ROM'S and you're all set. ROM'S available for Epson, C. Itoh, NEC, and Okidata – others available soon. Specify printer when ordering. Call for Price.

THE UPGRADEABLE PPC-100 PARALLEL PRINTER CARD

A Universal Centronics type parallel printer board complete with cable and connector. This unique board allows you to turn on and off the high bit so that you can access additional features in many printers. Easily upgradeable to a fully intelligent printer board with graphics and text dumps. Use with EPSON, C. ITOH, ANADEX, STAR-WRITER, NEC, OKI and others with standard Centronics configuration. **$139.00**

IF YOU WANT GRAPHICS AND FORMATTING THEN CHOOSE THE PERFORMER



for Epson, OKI, NEC 8023, C. ITOH 8510 provides resident HIRES screen dump and print formatting in firmware. Plugs into Apple slot and easy access to all printer fonts through menu with PR# command. Use with standard printer cards to add intelligence. **$49.00** specify printer.

THE MIRROR FIRMWARE FOR NOVATION APPLE CAT II®

The Data Communication Handler ROM Emulates syntax of an other popular Apple Modem product with improvements. Plugs directly on Apple CAT II Board. Supports Videx and Smarterm 80 column cards, touch tone and rotary dial, remote terminal, voice toggle, easy printer access and much more. List $39.00 Introductory Price **$29.00**

MINI ROM BOARDS

Place your 2K program on our Mini Rom Board. Room for one 2716 EPROM. Use in any slot but zero. Only **$34.95**

DOUBLE DOS Plus

A piggy-back board that plugs into the disk-controller card so that you can switch select between DOS 3.2 and DOS 3.3 DOUBLE DOS Plus requires APPLE DOS ROMS. **$39.00**

SOFTWARE APPLE

Super Pix

Hires screendump software for the Epson, OKI, C. Itoh and Nec 8023. Use with Tymac PPC-100. Special **$19.95** (Specify Printer)

***Mr. Lister* – Customer Contact Profiler & Mailer**

A Super Mail List Plus more — up to 1000 Entries on single 3.3 Disk (only 1 Drive required) — 2 second access time to any name — full sort capabilities — Dual Index Modes — supports new 9 digit Zip. Easy to follow manual — Not Copy Protected — 4 user defined tables with 26 sort selections per table — Beta tested for 6 months — user defined label generation. Introductory Price $135. **$99.00** Dealer &: Dist. Inquiries Invited.

APPLE LINK

A communications system for the Apple® (Requires Hayes Micro Modem). Transmit and receive any type of file between APPLES®, Automatic multi-file transfer, real time clock indicating file transfer time. Complete error check. Plus conversation mode. Only one package needed for full transfers. Compatable with all DOS file types. (requires Hayes Micro Modem) **$59.00**

THE APPLE CARD/ATARI CARD

Two sided 100% plastic reference card Loaded with information of interest to all Apple and Atari owners. **$3.98**

FOR THE **VIC 20®** NEW

Word Wizard

A user friendly WORD PROCESSOR with full joystick control (use of joystick optional). Easy edit and string manipulation commands that follow the standard VIC 20® format. Full use of function keys for ease of use.

*Requires at least 8K RAM cartridge. Only **$34.95***

Universal Tape Interface & Duplicator

No need to use the VIC 20 Recorder with this device you can easily load, save or even duplicate tapes easily with your recorder. Full LED indication of Data transfer makes this the most reliable way to load, Save and Duplicate. A complete I/O device with extras. Only **$49.95**

Look out for our NEW exciting cartridge and tape programs, reasonably priced memory boards and more for the VIC 20 and soon for the VIC 64. Call or write for our catalog of exciting Vic 20 products.

Dealer and Distributor Inquiries Invited.

VISA MasterCard

MICRO-WARE DIST. INC.
P.O. BOX 113 POMPTON PLAINS, N.J. 07444
201-838-9027

CIRCLE 211 ON READER SERVICE CARD

The last command, QUIT, simply ends the program. To prevent loss of your character set accidentally, the QUIT command asks if you are sure you want to quit.

Using the Characters in Other Programs

To use the characters made by the IBM PC Character Generator in your own program, type the instructions in Listing 1, either directly into RAM or as part of your program. This example assumes that your special character set will be loaded at memory location 1700:0, and is named GREEK.CHR.

Remember that the characters can be used only in a graphics mode. For 80 columns, use screen two (640 x 200); for 40 columns, use screen one (320 x 200). The characters will be displayed in the foreground color. If you wish to change this color, you can always use the BASICA PAINT command to fill the character. In 80 column mode you are stuck with black and white.

To type one of your characters, simply hold down the CTRL and ALT keys and type the three digit ASCII number in decimal of the desired character. For example, to get character 143, use this sequence: CTRL-ALT-1-4-3.

You can now use your custom made character set. □

Listing 1.

```
10 DEF SEG=0                    'Set the segment to 0'
20 POKE &H7F,&H17               'High byte of segment of characters
30 POKE &H7E,&H00               'Low byte of segment of characters'
40 POKE &H7D,&H00               'High byte of offset of characters'
50 POKE &H7C,&H00               'Low byte of offset of characters'
60 DEF SEG=&H1700               'Set segment of desired character
                                   segment location'
70 BLOAD "GREEK.CHR",0          'Load character set with offset'
```

Listing 2.

```
90 '
100 SCREEN 1:CLS:OUT 980,2:OUT 981,44
110 KEY OFF:LOCATE 1,2:DEF SEG=0
120 DIM C%(50)
130 LINE (150,100)-(170,100):LINE (160,95)-(160,105)
140 GET (150,95)-(170,105),C%
150 CLS:XPOS=4:YPOS=4
190 PRINT "Character Generator I  By C. Kenny Fan"
200 GOSUB 10000
210 GOSUB 11000
220 GOSUB 12000
230 PUT (XPOS*25+22,YPOS*15+22),C%
235 S=PEEK(&H7F)*256+PEEK(&H7E):O=PEEK(&H7E)
*256+PEEK(&H7C)
240 A$=INKEY$:IF A$="" THEN 240
245 LOCATE 18,1:PRINT A$
250 PUT (XPOS*25+22,YPOS*15+22),C%
300 IF A$="M" OR A$="m" THEN 1000
310 IF A$="U" OR A$="u" THEN YPOS=YPOS-1:IF YPOS<0
THEN YPOS=7
320 IF A$="D" OR A$="d" THEN YPOS=YPOS+1:IF YPOS>7
THEN XPOS=7
330 IF A$="L" OR A$="l" THEN XPOS=XPOS-1:IF XPOS<0
THEN XPOS=0
340 IF A$="R" OR A$="r" THEN XPOS=XPOS+1:IF XPOS>7
THEN YPOS=0
350 IF A$="P" OR A$="p" THEN CIRCLE (XPOS*25+33,
YPOS*15+27),9,,,,3/5:PAINT (XPOS*25+33,YPOS*15+27)
360 IF A$="E" OR A$="e" THEN PAINT (XPOS*25+33,
YPOS*15+27),0,0
370 IF A$="Q" OR A$="q" THEN 2000
380 IF A$="C" OR A$="c" THEN 150
390 IF A$="F" OR A$="f" THEN 3000
400 IF A$="S" OR A$="s" THEN 4000
410 IF A$="A" OR A$="a" THEN 5000
420 IF A$="G" OR A$="g" THEN 6000
430 IF A$="N" OR A$="n" THEN 7000
999 GOTO 230
1000 LOCATE 21,1:INPUT "Segment : ",A
1005 IF A<0 THEN A1=A+65536! ELSE A1=A
1010 LOCATE 21,1:GOSUB 16000
1020 INPUT "Offset : ",O
1025 IF O<0 THEN O=O+65536! ELSE O1=O
1030 POKE &H7F,A1/256:POKE &H7E,A MOD 256
1040 POKE &H7D,O1/256:POKE &H7C,O MOD 256
1050 LOCATE 21,1:GOSUB 16000:GOSUB 10000:GOTO 230
2000 LOCATE 21,1:PRINT "Quit (Y/N) ?"
2010 GOSUB 15000
2020 IF A$="Y" OR A$="y" THEN CLS:PRINT "BYE!":END
2030 LOCATE 21,1:GOSUB 16000:GOTO 230
3000 LOCATE 21,1:INPUT "ASCII code (128-254) : ",A
3010 IF A<128 OR A>254 THEN BEEP:GOTO 3000
3020 LOCATE 21,1:GOSUB 16000
3040 DEF SEG=S
3050 A=A-128:FOR I=0 TO 7
3055  Z=0
3060  FOR X=33 TO 208 STEP 25
3070   IF POINT (X,I*15+27)=3 THEN Z=Z+2^(7-(X-33)/25)
3080  NEXT:POKE O+A*8+I,Z
3090 NEXT
3100 DEF SEG=0:GOSUB 10000:GOTO 230
4000 DEF SEG=S
4020 LOCATE 21,1:INPUT "Filename : ",F$
4030 LOCATE 21,1:GOSUB 16000
4040 BSAVE F$,0,1024
4050 DEF SEG=0:GOTO 230
5000 DEF SEG=S
5020 LOCATE 21,1:INPUT "Filename : ",F$
5030 LOCATE 21,1:GOSUB 16000
5040 BLOAD F$,O
5050 DEF SEG=0:GOSUB 10000:GOTO 230
6000 LOCATE 21,1:INPUT "ASCII code (128-254) : ",A
6010 IF A<128 OR A>254 THEN 6000
6020 LOCATE 21,1:GOSUB 16000
6025 PRINT "Merge the character (Y/N) ?":GOSUB 15000
6028 LOCATE 21,1:GOSUB 16000
6050 DEF SEG=S
6060 FOR Y=0 TO 7
6070  B=PEEK(O+(A-128)*8+Y)
6080  FOR X=0 TO 7
6090   IF B AND 2^(7-X) THEN CIRCLE (25*X+33,Y*15+27)
,9,,,,3/5:PAINT (X*25+33,Y* 15+27) ELSE IF A$<>"y"
AND A$<>"Y" THEN PAINT (X*25+33,Y*15+27),0,0
6100  NEXT
6110 NEXT:DEF SEG=0:GOTO 230
7000 LOCATE 21,1:PRINT "New: are you sure? (Y/N)"
7010 GOSUB 15000:LOCATE 21,1:GOSUB 16000
7020 IF A$="Y" OR A$="y" THEN DEF SEG=S:FOR I=0
TO O+1023:POKE I,0:NEXT:DEF SEG=
0:GOTO 150
7030 GOTO 230
10000 LOCATE 3,32:PRINT "89ABCDEF"
10010 A$="0123456789ABCDEF"
10020 FOR VTAB=4 TO 19
10030  LOCATE VTAB,31:PRINT MID$(A$,VTAB-3,1);
10040 LOCATE VTAB,40:PRINT MID$(A$,VTAB-3,1);
10050 NEXT
10060 LOCATE 20,32:PRINT "89ABCDEF"
10070 FOR I=128 TO 255
10080  LOCATE I MOD 16+4,INT(I/16)+24
10090  PRINT CHR$(I);
10100 NEXT
10105 LOCATE 2,2:PRINT "Character set location:
"HEX$(PEEK(&H7F)*256+PEEK(&H7E))
":"HEX$(PEEK(&H7D)*256+PEEK(&H7C))"
10110 RETURN "
11000 LOCATE 22,1
11020 PRINT "U)p  D)own  L)eft  R)ight  P)lot
E)raseF)inished  G)et a character
S)ave set  A)ccess  M)emory  C)lear  N)ew  Q)uit";
11030 RETURN
12000 FOR I=0 TO 8:LINE (I*25+20,20)-(I*25+20,140)
:LINE (20,I*15+20)-(220,I*15+2
0):NEXT
12010 RETURN
15000 A$=INKEY$:IF A$="" THEN 15000 ELSE RETURN
16000 PRINT SPACE$(30);:LOCATE ,1:RETURN
```

SOFTWARE

Applied Software Technology

Versaform	$291.75

Art-Sci./Softape

Magic Window	$74.95
Basic Mailer	52.49
Magic Spell	52.49

Avant Garde

Hi-Res Golf	$22.50
Hi-Res Secrets	94.95
Zero-Gravity Pinball	22.50
Sentence Diagramming	18.75

Broderbund

Galactic Empire	$18.75
Apple Panic	22.50
Payroll	296.25
General Ledger	371.25

Budgeco

Raster Blaster	$22.50

California Pacific

Budge's 3D Graphics	$29.95

Continental Software

General Ledger	$188.75
Accounts Receivable	188.75
Accounts Payable	188.75
Payroll	188.75
Property Management	371.25
Home Accountant	56.50
Guardian	22.50
First Class Mail	56.50

Dakin 5

Rings of Saturn	$29.95
Depreciation Planner	295.00
Budget Planner	111.50
Bus. Bookkeeping Sys.	295.00

Datamost

Thief	$22.50
Snack-Attack	22.50
Tax Beater	97.50
Real Estate Anal. Program	97.50

Edu-Ware

Algebra I	$29.95
Compu-Math: Arithmetic	37.50
Compu-Math: Fractions	29.95
Compu-Math: Decimals	29.95
Spelling Bee	29.95
Perception (3.0)	18.75
Algebra II	29.95

Howard Software

Creative Financing	$146.75
Real Estate Analyzer	146.75
Tax Preparer	112.50

Innovative Design

Pool 1.5	$24.95
Shuffleboard	22.50
Trick Shot	29.95

IUS

Easy Writer	$75.00
Easy Mailer	52.50
Date Dex	112.50

L&S Computerware

Crossword Magic	$37.95

L.J.K. Enterprises

Letter Perfect	$112.50
Data Perfect	75.00

Mesa Research

Investment Decisions	$75.00

Micro Lab

Dog Fight	$22.50
The Learning System	112.50
The Invoice Factory	150.00
Tax Manager	112.50
Asset Manager	150.00
Visifactory	56.95
Visiblend	37.50
Roach Hotel	24.95
Data Factory (5.0)	225.00

Muse

Super-Text 40/80	$135.00
Form Letter Module	75.00
Castle Wolfenstein	22.50
Three Mile Island	29.95
ABM	18.75
Data Plot	43.95
Elementary Math	29.95

On-Line Systems

Hi Res #1: Mystery House	$18.75
Hi Res #2: Wizard and Princess	24.95
Hi Res #3: Cranston Manor	29.95
Hi Res #4: Ulysses	29.95
Hi Res Football	29.95
Screen Writer II	97.50
Hi Res Soccer	22.95
The General Manager	112.50
Time Zone	75.00
Memory Management System	37.50
The Dictionary	75.00
Frogger	24.95
Screen Writer Pro	150.00

Silicon Valley

Word Handler	$188.00
List Handler	60.00
Appointment Handler	29.95

Sirius Software

E-Z Draw (3,3)	$37.50
Space Eggs	22.50
Gamma Goblins	22.50
Gorgon	29.95
Sneakers	22.50
Beer Run	22.50
Computer Football	22.95
Fly Wars	22.95

Penguin Software

Complete Graphics II	$60.00
3D Drawing System	24.95
100 Color Drawing System	24.95
Special Effects	29.95
The Graphics Magician	45.00
Additional Fonts & Sets	15.00
Magic Paintbrush	22.95
Complete Graphics (TABLET VER.)	90.00
Special Effects (TABLET VER.)	60.00

Personal Business Systems

Executive Secretary	$188.00
The Executive Speller	60.00

Piccadilliy Software

Warp Destroyer	$22.95
Star Blaster	22.95

Professional Software Tech

Executive Briefing System	$150.00

Sir-Tech

Wizardry	$37.50

Software Publishing Corp.

PFS	$93.95
PFS REPORT	60.00
PFS Graph	93.95

Southwestern Data

Apple Doc	$37.50
The Correspondent	45.00
Apple II Utility Pack	14.95
ASCII Express	60.00
On-Line Dial Up	75.00
Norad	29.95

Stoneware

D. B. Master	$175.00

Strategic Simulations

Computer Bismark	$45.00
Warp Factor	29.95
Computer Baseball	29.95

Synergistic Software

Program Line Editor	$29.95
The Data Reporter	165.95
The Directory Manager	22.95
Planetary Guide	22.95
Game Animation Package	37.50
Global Program Line Editor	45.00

U S A Software

Supercram	$135.00
Request	169.95
3D Supergraphics	29.95

Micro Pro

Wordstar	$250.00
Spellstar	125.00
Mailmerge	78.95
Datastar	175.00
Supersort	125.00
Calcstar	175.00

SYSTEMS IV
P.O. BOX 2633
PEACHTREE CITY, GA 30269

VISA

FREE!

DISK DRIVE

mastercharge

FRANKLIN ACE1000

- Apple II compatible
- 64K of RAM
- Upper and lower case
- Typewriter-style keyboard
- 12-key numeric pad
- Alpha lock key
- VisiCalc keys
- 50-watt power supply
- Built-in fan

PACKAGE PRICE

• ACE 1000	**$1690**	$1595
• DISK DRIVE		N/C
• CONTROLLER CARD		95

DISK DRIVES

Franklin	$549.00
M-SCI A-2	400.00
M-SCI A-40	395.00
M-SCI A-70	535.00
Controller Card	99.00

PRINTERS

Okidata

80	$375.00
82A	560.00
84P	1,195.00
84S	1,295.00

Bytewriter **$995.00**

Transtar

Daisywheel	$1,395.00

MONITORS

BMC

12" green phos.	$99.00

Amdek

12" B & W	$135.00
12" green phos.	175.00

ACCESSORIES

Microtek

16K RAM BD	$110.00
Para. inter	100.00

Videx

Video term	$295.00
Enhance II	125.00

Orange

Grappler plus	$145.00

ALS

Z Card	$245.00
Smart term	295.00

Mt. Hdwe.

CPS Card	$175.00
TG Joy Stick	49.00

Prometheus

Versa Card	$189.00

1-800-227-3800 / Ext. 431

Ga. Residents Add 4% Tax

CIRCLE 277 ON READER SERVICE CARD

TRS-80 Graphics Made Almost Painless

Part 1

John Crew

This is the first of a three-part series on graphics creation for purposes such as doodling, making limited resolution artwork, and designing graphics for your own programs.

The programs are intended to simplify graphics creation for the above purposes, and should be of interest to novice and expert computer users.

This article describes an etch-a-sketch program that I call Sketch/Print. The second article describes a program, called Vector Plotter, which draws lines between any two points on the screen that you specify. The last article describes a program, Graphics Manager, which stores whatever is on the screen. Graphics Manager can store up to nine pictures, which I call frames, that can have either standard or double width characters. Using Graphics Manager, frames can be saved on tape, loaded from tape, compressed, printed on paper, combined, and have the ASCII number of every byte in them listed.

Sketch/Print and Vector Plotter can be used independently, or you can add Graphics Manager to either. I recommend that you type them as shown alone, test them individually, and correct your typographical errors, and then if you desire, follow the instructions in Part 3 of this series to add Graphics Manager to one or both of the others.

Programmers who have more than 16K of free RAM may want to combine all three programs. That is a fairly simple task if you know Basic well, have about 18K of free RAM, and have an excellent line renumbering program.

John Crew, 1106 Karin Dr., Normal, IL 61761.

System Requirements

All of the programs in this series are written in Level II Basic for an unmodified Model I, 16K, cassette system. All programs except Graphics Manager will easily fit into 4K of free RAM. Using Graphics Manager with one of the other programs requires at least 16K of free RAM, and it is a tight fit so there probably is not enough room for anything else except a very short program such as a simple key debounce program.

To print frames on paper using Graphics Manager you need an MX-80 printer (the basic model without the new features is adequate), or you will have to modify the program. The article on Graphics Manager will describe how frames are stored, which should be very helpful to those who want to modify the program.

Because I used POKE statements and some other tricks which are unique to the previously described system, the programs in this series will probably require modifications to work on a Model III, a differently configured Model I, or other computer.

I spent many hours developing and debugging the programs in this series so I do not think they contain any errors. The programs have many tests to reject clearly erroneous commands. The only problem I am aware of is that some parts of the programs are not written in the most efficient and neat manner. There are no syntax errors, so do not change any statements which look wrong to you. If you find statements which you think are unnecessary, please leave them alone; there is probably a good reason for their inclusion.

One good book which helped me gain the skills and knowledge which I needed to write these programs was William Barden's *Programming Techniques for Level II Basic* which is sold by Radio Shack. I highly recommend that book to intermediate Basic programmers who want to become more versatile.

Program Modification

The three main programs are written very compactly to save memory space and execution time. To this end I willingly sacrificed some legibility and ease of comprehension. For Basic programs they are rather fast. They could be made even faster if you rewrote them so the subroutines were put as close to the beginning as possible with the most frequently used subroutines first.

Another way to make the programs run faster if you have memory in the expansion interface is to set the memory size to 32769 so Basic will use the faster RAM in the keyboard. When you type them, omit all REM statements.

I strongly urge you to learn about the EDIT mode of Level II Basic before typing any program which has long lines since that knowledge will probably save you much frustration. Where you see what appears to be a long string of blanks, in the program I have used the ↓ key to start a new line on the screen; there are no long strings of blanks in my programs because they waste space and formatted output is better produced with STRING$ or TAB in a PRINT statement, or, of course, PRINT USING.

apple discount software

CALSOFT

Personal—Entertainment—Business SOFTWARE

Low Discount Prices / 15% to 25% Discount off List Price
Fast Convenient Service / We ship same or next day
Large Selection of Software / Call or Write for our FREE Catlog!

We have all the latest software—ASK US!

ATARI, IBM PC, CP/M: send for FREE catalog!

Call Toll Free: *(800) 423-5290* ***In California:*** *(213) 991-9641*

AVANT-GARDE

	Retail Price	Our Price
★ **Hi-Res Secrets**	**125.00**	**93.75**
Hi-Res Computer Golf	29.95	25.45
Zero Gravity Pinball	29.95	25.45
Word Scrambler/Super Speller	19.95	16.95

BRODERBUND

Apple Panic	29.95	25.45
David's Midnight Magic	34.95	29.70
★ **The Arcade Machine**	**59.95**	**44.95**
Track Attack	29.95	25.45
Star Blazer	31.95	27.15
Labyrinth	29.95	25.45
Choplifter	34.95	29.70
★ **Deadly Secrets**	**34.95**	**26.20**
Serpentine	34.95	29.70
Sea Fox	29.95	25.45
Hard Hat Noah	29.95	25.45

CONTINENTAL

★ **Home Accountant**	**74.95**	**56.20**
CPA Modules #1-4 (each)	250.00	212.50
★ **First Class Mail**	**74.95**	**56.20**

DATA MOST

Snack Attack	29.95	25.45
Thief	29.95	25.45
Swashbuckler	34.95	29.70
Casino	39.95	33.95
World Series Baseball	29.95	25.45
Missing Ring	29.95	25.45
Pig Pen	29.95	25.45

EDU-WARE

Empire I World Builders	32.95	28.00
Empire II Interstellar Sharks	32.95	28.00
★ **Rendezvous**	**39.95**	**29.95**
Prisoner 2	32.95	28.00
Algebra series (each)	39.95	33.95
Fractions/Decimals (each)	49.00	41.65
PSAT/SAT Word Skills (each)	49.00	41.65

HAYDEN

Sargon II	34.95	29.70
★ **Pie Writer**	**149.95**	**112.45**

INFOCOM

★ **Zork I**	**39.95**	**29.95**
Zork II	39.95	33.95
Zork III	39.95	33.95
Deadline	49.95	42.45

MICROSOFT

Adventure	29.95	25.45
Typing Tutor II	24.95	21.20
Olympic Decathlon	29.95	25.45
★ **TASC Compiler**	**175.00**	**131.25**

MUSE

Super Text 40/80	175.00	148.75
★ **Super Text 40/56/70**	**125.00**	**93.75**
Castle Wolfenstein	29.95	25.45

ON-LINE SYSTEMS

	Retail Price	Our Price
HI-RES Adventures 0-5		**15% OFF**
★ **Cross-Fire**	**29.95**	**22.45**
LISA	79.95	**67.95**
★ **LISA Educational System**	**119.95**	**89.95**
★ **General Manager**	**219.95**	**164.95**
Threshold	39.95	**33.95**
Screen Writer	129.95	**110.45**
★ **Screen Writer Professional**	**199.95**	**149.95**
Mouskattack	34.95	**29.70**
★ **Marauder**	**34.95**	**26.20**
Ultima II	59.95	**50.95**
EPF IV	79.95	**67.95**
Frogger	34.95	**29.70**
Cannonball Blitz	34.95	**29.70**
★ **The Artist**	**79.95**	**59.95**
Laf-Pak	34.95	**29.70**
Pest Patrol	29.95	**25.45**
Lunar Leepers	29.95	**25.45**

PEACHTREE

★ **Accounts Payable**	**400.00**	**320.00**
★ **Accounts Receivable**	**400.00**	**320.00**
★ **General Ledger**	**400.00**	**320.00**
Inventory Control	400.00	**340.00**
Payroll	400.00	**340.00**

PENGUIN

Complete Graphics System	69.95	**59.45**
★ **Graphics Magician**	**59.95**	**44.95**
Special Effects	39.95	**33.95**

SENSIBLE

Super Disk Copy III	30.00	**25.50**
Multi-Disk Catalog	25.00	**21.25**
★ **Sensible Speller**	**125.00**	**93.75**

SIR-TECH

Wizardry	49.95	**42.45**
Knight of Diamonds	34.95	**29.70**
Star Maze	34.95	**29.70**

SOFTWARE PUBLISHING

★ **PFS**	**125.00**	**93.75**
PFS: Report	95.00	**80.75**
PFS: Graph	125.00	**106.25**

STONEWARE

★ **DB MASTER**	**229.00**	**171.75**
DB Master Utility Pak #1	99.00	**84.15**
★ **DB Master Utility Pak #2**	**99.00**	**74.25**
Graphics Processing System	59.95	**50.95**

SYSTEMS PLUS

General Ledger	395.00	**335.75**
Accounts Payable	395.00	**335.75**
Accounts Receivable	395.00	**335.75**

TG PRODUCTS

Game Paddles	39.95	**33.95**
★ **Joystick**	**59.95**	**44.95**
Select-a-Port	59.95	**50.95**

SIRIUS SOFTWARE

	Retail Price	Our Price
★ **Gorgon**	**39.95**	**29.95**
Sneakers	29.95	**25.45**
Beer Run	29.95	**25.45**
The Joyport	49.95	**42.45**
Snake Byte	29.95	**25.45**
★ **Kabul Spy**	**34.95**	**26.20**
Minotaur	34.95	**29.70**
Bandits	34.95	**29.70**
Escape from Rungistan	29.95	**25.45**
Cyclod	29.95	**25.45**
Fly Wars	29.95	**25.45**
Free Fall	29.95	**25.45**
★ **Way Out**	**39.95**	**29.95**
Blade of Blackpool	39.95	**33.95**
Type Attack	39.95	**33.95**

STRATEGIC SIMULATIONS

Cartels & Cutthroats	39.95	**33.95**
Computer Quarterback (2nd Ed.)	39.95	**33.95**
The Shattered Alliance	59.95	**50.95**
★ **Southern Command**	**59.95**	**44.95**
Napoleon's Campaigns	59.95	**50.95**
Battle of Shiloh	39.95	**33.95**
Tigers in the Snow	39.95	**33.95**
Road to Gettysburg	59.95	**50.95**
Pursuit of the Graf Spee	59.95	**50.95**
★ **Guadalcanal Campaign**	**59.95**	**44.95**
Cytron Masters	39.95	**33.95**
Galactic Gladiators	39.95	**33.95**
SEUIS	39.95	**33.95**
The Cosmic Balance	39.95	**33.95**

VISICORP

★ **Visicalc**	**250.00**	**193.75**
Visitrend/Visiplot	300.00	**255.00**
Visidex	250.00	**212.50**
Visiterm	100.00	**85.00**
★ **Visifile**	**250.00**	**193.75**
Visischedule	300.00	**255.00**

We also carry complete lines from the following companies:

ADVENTURE INTERNATIONAL
ARTSCI • ASHTON-TATE
AUTOMATED • BEAGLE
BUDGECO • CAL PACIFIC
CAVALIER • GEBELLI
HOWARD • INNOVATIVE
KENSINGTON • MICROLAB
MICROPRO • PHOENIX
PICCADILLY • QUALITY
SENTIENT • SORCIM
SOUTHWESTERN • SUBLOGIC
SYNERGISTIC • VIDEX

If you don't see it, Ask Us!

CALSOFT

346 N. Kanan Rd. #103
Agoura, CA 91301

Call Toll Free: *(800) 423-5290* ***In California:*** *(213) 991-9641*

We accept Mastercard & Visa (include # and Expiration Date), check, COD ($1.50 extra), or Money Order. California residents add 6% sales tax. Include $2.00 for shipping (UPS Blue Label $3.00, Canada $6.00, other foreign countries $10.00).

★ **Sale prices are through December only! Prices subject to change without notice.**

CIRCLE 127 ON READER SERVICE CARD

I used many tricks to save memory, some of which I have rarely or never seen used before. For example, there are only two cases in which a semicolon is needed in a PRINT statement: at the end of a PRINT statement to suppress a line advance, and to indicate the separation of two variable names. Many people use unnecessary semicolons in PRINT statements.

Figure 1 gives examples of compact PRINT statements which are designed to print the current values of two variables named A and B. Notice in particular that the first example will not work as intended; it will print a single value which is the value of a variable named AB if such a variable is used in the hypothetical main program. If AB is not used elsewhere, Level II will set aside space for AB and set its value to zero. Also notice that putting a space between the A and the B will not affect that PRINT statement, because Level II Basic almost always ignores spaces in statements. The other examples will properly print two values.

About Sketch Print

Most of the etch-a-sketch programs which I have seen range in quality from mediocre to dreadful. I decided to write a better program which would use a small graphics block instead of a large graphics character, which was compact and efficient, and which did not behave oddly when the edge of the screen was reached.

Sketch/Print can work in two different ways (modes): graphics mode and alphanumeric mode. When you run it, you will first see the instructions. Next you will see a small graphics block at the lower lefthand corner of the screen. When that block appears, you are in the graphics mode.

The Graphics Mode

In the graphics mode you can move the cursor using the keys 1-9 on the numeric keypad (or the numeric keys on the main keyboard) in a pseudo-joystick fashion. The 8 key moves the cursor straight up, the 9 moves it diagonally upward to the right, the 6 moves it to the right, etc.

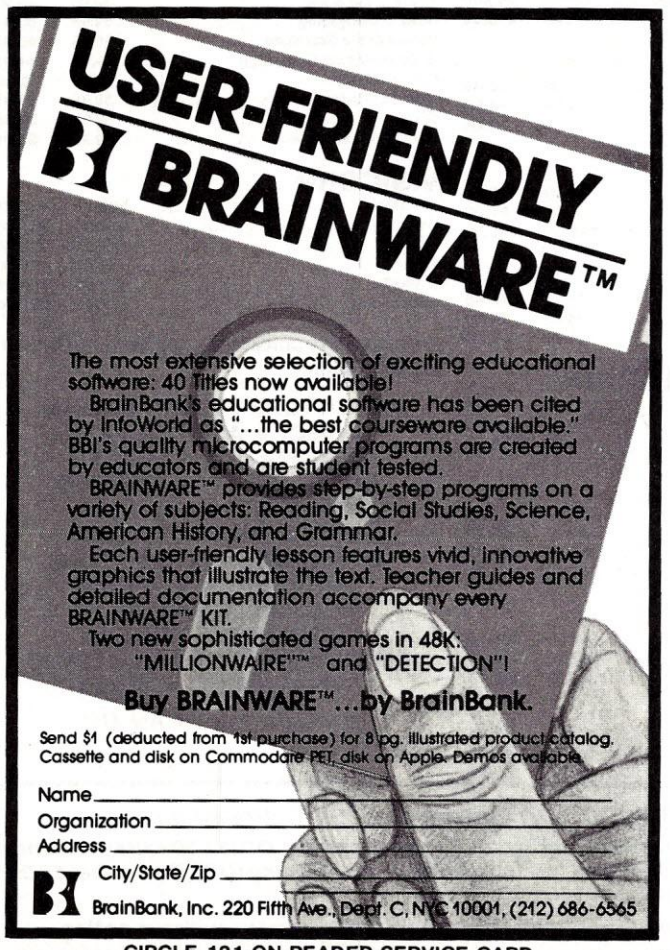
Using the 5 key, you can turn on a graphics block at the current cursor location. The other keys (1-3, 4, 6, 7-9) first move the cursor and then turn on a graphics block. The keys in the numeric keypad will repeat as long as you hold them down. If you find the rate of repetition too fast, increase the value assigned in line 380 to the variable named T and insert this at the beginning of line 350:

T=#:GOSUB410:

(using a digit in place of #).

Figure 1. Examples of Compact PRINT Statements.

Compact Form	Functionally Equivalent Form	Separator of Variable Names
PRINTAB	PRINTA B	none
PRINTA;B	PRINT A; B	;
PRINTA%B	PRINTA% B	%, type declaration character
PRINTA" AND "B	PRINT A " AND " B	literal character string
PRINTASIN(C)B	PRINT A SIN(C) B	function name
PRINTATAB(10)B	PRINT A TAB(10) B	Basic keyword



CIRCLE 121 ON READER SERVICE CARD

NEW!! The Apple users group software library bonanza at truly affordable prices. For the first time enjoy your Apple to its fullest capacity using specially packed disks with over **60 outstanding programs each.** Not available from any other source!

• Applesoft • 3.3 DOS

BK APPLEWARE INC. offers An extensive variety of interesting, useful and entertaining programs indispensable to the serious computerist including:

Business •	Educational •	Graphics
Games •	Music •	Science
Utilities •	Data Base •	Finance . . .

Library disks 1, 2 & 3 are mixed categories and new disks 4 (Games), 5 (Utilities), 6 (Graphics) & 7 (Integer) at $59.95 each. Why pay more?

Order direct from this ad and $ave up to $136. Buy disk library package 1, 2 & 3 and get a special bonus disk **FREE** — over **260** programs for $179.95 + shipping. For best value, get all 8 disks for $349, postage prepaid, for over **530** of our best programs at 65¢ each!
Call now toll free: 1-800-327-8664
Florida: 1-305-987-8665
6400 Hayes St.
Hollywood, FL 33024

master charge VISA

CIRCLE 112 ON READER SERVICE CARD

HUNTINGTON COMPUTING

Softlights

By Fred Huntington

Did you know we send out twenty thousand or more sales bulletins every two months?

Did you know that our sales are probably the best sales you've ever seen? Last month we sold the Elephants at an introductory price, the people who got the sales bulletins were able to buy them a month before the rest of the country.

One of the items in the current sale is ribbon cartridges (not just refills) for the MX-80 at **$4.99** each, MX-100 **$14.99.**

How do you get on the mailing list? There's only one way. That's to place an order. Requesting a catalog won't do it. But, once you buy from us, you're stuck on our mailing list.

Future sale flyers will contain fabulous bargains, both old and new items.

So, to entice you to want to get on the mailing list, there are some super specials listed elsewhere in this page.

SUPER-DUPER JOYSTICKS

Last month Barb ordered me a Wico joystick for evaluation without telling me first. When it came in I couldn't believe it. It is the most substantial joystick for the Atari I've ever seen. It's made by the same people who make the ones for the commercial arcade games. Made for the Atari, they will work with the Apple with an adaptor or the Joyport. There's also a fancier model with a chrome shaft and red ball on top. They also make a trackball controller that will blow your mind.

#160 **Command Controller** ($29.95) now **$24.44**

#161 **Red Ball** ($34.95) now **$29.44**

#162 **Trackball** ($69.95) now **$54.44**

These prices are good through Jan. 30, 1983.

VERBATIM CLEANING KIT - $5.00

Here's a loss-leader that we hope will entice you to buy from us. When you make any purchase, you can but a $12.95 Verbatim cleaning kit for only $5.00. One to a customer or family, only while supply lasts. When this ad was written, there were 400 on the way to us. So, when these are gone, that's it. Order stock #4012.

GENERIC COMPUTER GAMES

We're revolting! Whoops, I mean we're revolting against high prices in computer games. As part of our effort, we are publishing the only Generic Computer Games in the world. Originally costing $14.95 each, I've taken Skeet Shoot, Trap Shoot (both HIRES) and put them on one disk along with a picture of Great Grandma Huntington.

They are two of the first games ever produced by a very famous software company. I bought the rights for them for $200 and decided to have some fun with them.

Made for the Apple, they come complete with a yellow documentation page, reminiscent of what you would find in your local supermarket. (After all, our shipping warehouse was at one time a supermarket.) Order #9008 for only **$9.99.**

WURST OF HUNTINGTON

We're still getting rave notices about the Wurst of Huntington. People are amazed at how we cut the price of Wurst from $19.99 to **$9.99.** Once they see the program, however, they understand.

One customer wrote us saying that the Wurst was a tribute to beginning programmers all over the world who would like to sell their programs. Another praised us saying Wurst was everything we promised.

So, if you want the worst eight programs ever assembled on one disk (and have a little fun, too), order #9010 for **$9.99.**

COMPUTER ALMANAC

We think that Computer Almanac, written by Dave Carman is a good buy. It's a weather predicter, a loan amortization program, and a wealth of general knowledge. Order #9014 for **$24.99.**

UNDERSTAND YOURSELF

Written by Mike Taylor, Understand Yourself is a series of tests to help you get a better psychological insight of yourself. Not meant to be a clinical substitute, Understand Yourself is fascinating and will keep you and your mate intrigued for hours. Order #9012 for **$24.99.**

Here's something new for all you Epson MX-80 and MX-100 lovers — the MXPLUS. This amazing gadget allows you to use your printer buttons to instantly select the print mode you want.

For instance, press the "on line" button three times and you have instant double size print. Press twice and you have condensed print. No soldering, cutting or drilling. Easy to install. Does not interfere with normal operation of printer or software. Our price **$44.99.**

Great Grandma Huntington Cared

INTEGER FIX, ETC.

Here's an easy-to-use program that will covert your Integer programs to Applesoft in nothing flat. #9543. **$19.99.**

We also carry the complete line of Market software including Tennis Draw, League Schedule, Long Term Reservations, Swim Meet, League Standings and more. Call for prices.

We also have Masterworks, Nutricalc, Execuware, PCP, Thesis, and much, much more.

Here's a special to catch before the price increase. We're selling Advance Access disk boxes ($24.95 list before price increase) for **$21.99.** Buy two or more and you can have them for **$19.99** each. These are super storage boxes and will hold up to 90 disks each. I have five of them at home.

We've got Pac-Man Ghost pins for $2.50, Super-Fan II for $59.00, Master Diagnostics Plus - for $55.00, Mail Ordering program $5.00, and Verbatim disks 10/$25.99 with a plastic carrying case.

STREET LIFE

We now carry Street Life, as featured in Play Boy. We don't recommend this for everyone and will not sell it to you if we even suspect you are under the age of twenty-one. Warning, some people may find the theme and language offensive. Our price, **$26.99.**

ATARI ATARI ATARI ATARI ATARI ATARI

Our collection of Atari games continues to grow. My personal favorite now is Frogger. Until Jan. 30 you can have this $34.95 game for only **$19.94** when you purchase any other item. Please specify cassette or disk. The graphics and sound on this program are superb.

Airstrike by English Software is a new game that has been very popular overseas. It only takes 16K and comes in cassette and disk versions. If you're bored by ordinary arcade-type games, Airstrike will present an enormous challenge to you. List price is $39.95. Until Jan. 30 you can have it for **$29.94.**

THANK YOU

Thank you to the many well-wishers on the birth of our son, Dale. He is very healthy and doing well. He's learning the computer business from the ground up. He's by Barb's desk every day. I'm sure many of you have heard him in the background when you call. You should see Barb trying to take an order over the telephone, punch numbers into the computer and nurse Dale, all at the same time.

One last item, we have a spiffy new lower case chip that's made for us locally. For a short time we are selling it for only **$15.00.** I wanted to call it the Buffalo Chip but I got out-voted. So, for $15.00 be sure to order the GGH lower case chip. (Can you guess what GGH stands for?)

HUNTINGTON COMPUTING
Post Office Box 1297
Corcoran, California 93212

Foreign Orders 209-992-4481
In California 800-692-4146

Apple® is a registered trademark of Apple Computer, Inc.
Pet® is a registered trademark of Commodore.
TRS-80® is a registered trademark of Tandy Corp.
Atari® is a registered trademark of Atari, Inc.

Outside Calif. 800-344-5106

We take **MasterCard, American Express or VISA** (Include card # and expiration date). California residents add 6% tax. Include $2.00 for postage. Foreign and hardware extra. Foreign (excluding Canada): remit U.S. currency, checks on U.S. banks, use listed charge cards, or make direct wire transfers through Security Pacific Bank, Corcoran, for a $6.00 charge. All overseas orders shipped by air. Send for free catalog. Prices subject to change without notice.

VALLEY SOF'TOUCH

DISCOUNT PRICES

NO FEES — NO DUES

!SPECIALS!
(with Coupon)

APPLE
Wizardry
Knight of Diamonds #2
$25.95

Screenwriter II
$89.95

VIC-20
Monster Maze
$27.95
(Cass. Only)

King Arthur's Heir
$21.95
(Cass. Only)

ATARI
Alien Garden
$27.95
(Cart.)

IBM-PC
JobberTalky
$21.95

TRS-80
Crunch, Crumble, Chomp
$21.95
(Cass.-Disk)

MAIL COUPON FOR FREE BROCHURE

* BOOKS *

SOFTWARE

MAIL COUPON TO:
VALLEY SOF'TOUCH
4974 N. FRESNO, SUITE 132
FRESNO, CA 93726

HARDWARE

Cut Along Dotted Line

☐ SEND ME FREE BROCHURE
☐ I AM INTERESTED IN HARDWARE
☐ I WANT TO PLACE AN ORDER NOW!

Item _____ $ _____
Item _____ $ _____
Add $1.50 Shipping - Calif. Res. Add 6% Tax
☐ Check ☐ Visa-Mastercard
Total $ _____
Card No. _____
COMPUTER TYPE _____
NAME _____
ADDRESS _____ ST. _____ ZIP _____
CITY _____

CIRCLE 281 ON READER SERVICE CARD

Painless Graphics, continued...

Listing 1. Characters Allowed in Alphanumeric Mode of SKETCH/PRINT.

```
10 CLS: PRINT "CHARACTERS WHICH CAN BE PRINTED IN THE ALPHANUMERIC MODE OF": PRI
NT "SKETCH/PRINT
20 DATA 32, 64, "BLANK SPACE, NUMERALS, AND SOME COMMON NONALPHABETIC SYMBOLS"
30 DATA 65, 90, UPPER CASE ALPHABET
40 DATA 91, 91, UPWARD ARROW
50 DATA 97, 122, LOWER CASE ALPHABET (CONVERTED TO UPPER CASE)
60 CLEAR50: DEFINTA-Y: DEFSTRZ
70 FOR I=1 TO 4: READ B, C, Z: PRINT: PRINT: PRINTZ
80   FOR J=B TO C: PRINT CHR$(J)" ";: NEXT
90 NEXT
99 GOTO 99
```

Listing 2. Example of SETting a Point in a Location Occupied by an Alphanumeric Character.

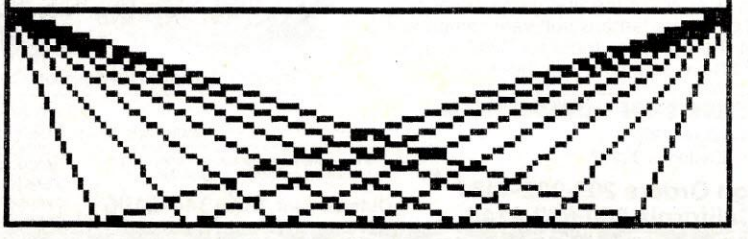
```
10 CLEAR 50: CLS: DEFINT X: DEFSTR A-B: A="THIS IS A TEST"
20 PRINT A: PRINTA: PRINT@ 960, "PRESS ANY KEY EXCEPT 'BREAK' TO CONTINUE.";
30 B=INKEY$:IFB=""THEN30
40 FOR X=0 TO 15: SET(X,5): NEXT
45 PRINT@ 960, CHR$(31);: REM  THIS STATEMENT ERASES THE SCREEN FROM POSITION #
960 TO 1023 (THAT IS, IT ERASES THE LAST LINE).
50 PRINT@ 896, "NOTICE THAT PART OF THE SECOND LINE WAS ERASED WHEN IT WAS
UNDERLINED.";
60 GOTO 60
```

Sample RUN of SKETCH/PRINT.

```
                SKETCH/PRINT BY JOHN CREW 12/24/81
                        GRAPHICS MODE
USE NUMERIC KEYPAD TO MOVE CURSOR AS SHOWN IN DIAGRAM.
USE THOSE KEYS WITH THE SHIFT KEY TO ERASE.
PRESS '.' TO SWITCH TO NONDESTRUCTIVE FLASHING CURSOR.
PRESS 'SHIFT .' TO RETURN TO NORMAL CURSOR.
PRESS 'SHIFT ←' TO SWITCH TO ALPHANUMERIC MODE.
PRESS 'S' TO STORE CURSOR LOCATION.
PRESS 'D' TO AUTOMATICALLY DRAW A LINE FROM THE STORED LOCATION TO THE PRESENT LOCATION.
PRESS 'E' TO DO SAME AS 'D' BUT ERASE.

                7   8   9
                 \  |  /
                4 - 5 - 6
                 /  |  \
                1   2   3

        PRESS ANY KEY BUT 'BREAK' TO CONTINUE
```

```
                    ALPHANUMERIC MODE

ALL PRINTABLE KEYBOARD CHARACTERS BUT LOWER CASE MAY BE USED.
PRESS '←' TO BACKSPACE AND ERASE LAST CHARACTER.
PRESS 'SHIFT →' TO RETURN TO GRAPHICS MODE.

                    BOTH MODES

PRESS 'SHIFT CLEAR' TO ERASE THE SCREEN.
PRESS 'ENTER' TO GO TO GRAPHICS MANAGER (IF IT HAS BEEN ADDED).

        PRESS ANY KEY BUT 'BREAK' TO CONTINUE
```

AFTER THOSE TWO SCREENS OF INSTRUCTIONS, THE GRAPHICS MODE WAS ENTERED. I THEN DREW A BORDER. NEXT I SWITCHED TO THE ALPHANUMERIC MODE TO TYPE THIS. BELOW IS A SAMPLE PICTURE.



WE WILL NOT BE UNDERSOLD

SOFTWARE

MICROPRO	
Wordstar	$239.00
Mailmerge	$ 89.00
Customization Notes	$359.00
Spellstar	$239.00
Datastar	$199.00
Calcstar	$199.00
MICROSOFT	
Basic Interpreter	$349.00
Basic Compiler	$389.00
Fortran 80	$499.00
Cobol 80	$695.00
DATA BASE	
dBase II	$599.00

IBM PC SOFTWARE

INFORMATION UNLIMITED	
Easy Writer	$289.00
Easy Speller	$149.00
Easy Filer	$319.00
VISICORP	
VisiCalc 256K	$199.00
VisiDex	$209.00
VisiFile	$219.00
VisiTrend/VisiPlot	$259.00
VisiTerm	$99.00
MICROPRO	
Mailmerge	$119.00
Wordstar	$239.00
MISCELLANEOUS	
Supercalc by Sorcim	$229.00
Superwriter by Sorcim	$289.00
Home Accountant Plus	$139.00
ENTERTAINMENT	
Deadline	$39.00
Temple of Apshai	$29.00
Curse of Ra	$15.99

Call For More IBM Software And Accessories

DISK DRIVES

CCI 100 for the TRS-80 Model 1	
5¼ 40 track	$299.00
CCI 189 for the Zenith Z-89	
5¼ 40 track	$379.00
CORVUS 5M with Mirror	$3089.00
CORVUS 10M with Mirror	$4489.00
CORVUS 20M with Mirror	$5389.00
CORVUS Interfaces	CALL

RANA SYSTEMS add-on Disc Drive for the Apple II

Elite Two 80 Track	CALL
Elite One 40 Track	CALL
Elite Controller	CALL
Elite Two 80 Track	CALL
Elite Three 80 Track double-sided	CALL

DISKETTES

Maxell 5¼ single side	$39.00
Maxell 8 single side	$49.00
Maxell 5¼ double side	$45.00
Maxell 8 double side	$55.00
BASF 5¼	$26.95
BASF 8	$36.00
Verbatim 5¼	$26.95
Verbatim 8	$36.00
Wabash 5¼	$21.95

IBM PC ACCESSORIES

64K Card by Microsoft	$435.00
Joystick by T & G	$49.00
128K Card	$579.00
192K Card	$629.00
256K Card	$699.00
Combo Card by Apparat	$249.00

Call for more IBM PC add-ons

For fast delivery, send certified checks, money orders, or call to arrange direct bank wire transfers. Personal or company checks require one to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

APPLE SOFTWARE

MICROPRO	
Wordstar	$199.00
Mailmerge	$89.00
Spellstar	$149.00
DataStar	$199.00
CalcStar	$189.00
VISICORP	
VisiCalc	$199.00
VisiTerm	$79.00
VisiDex	$199.00
VisiPlot	$169.00
VisiFile	$199.00
VisiSchedule	$259.00
VisiTrend/Plot	$239.00
MISCELLANEOUS	
Micro Courier	$219.00
Screen Director	$129.00
Executive Briefing System	$169.00
Supercalc	$199.00
Personal Filing System	$115.00
PFS Report Writer	$75.00
Word Handler	$169.00
ENTERTAINMENT	
Beer Run	$28.00
Zork I, II	$26.95
Deadline	$39.00
Chop Lifter	$24.95
Cannonball Blitz	$29.95
Knights of Diamonds	$29.95
Midnight Magic	$32.00
Wizardry	$45.00
Tuesday Morning Quarterback	$24.95
Crush, Crumble & Chomp	$24.95
Datestones of Ryn	$15.99
Morloc's Tower	$15.99
Snack Attack	$23.95
Star Blazer	$24.95

APPLE ACCESORIES

ADVANCED LOGIC	
Add-Ram 16K Card	$99.00
Z-Card CP/M for the Apple II	$225.00
Smarterm 80 Column Board w/Softswitch	$249.00
Z-80 Card by Microsoft	$319.00
16K Card by Microsoft	$159.00
32K Card by Saturn	$199.00
Keyboard Enhancer II by Videx	$125.00
Videoterm by Videx	$259.00
Game Paddles by TG	$49.00
Joystick by TG	$49.00
Numeric Keypad by Keyboard Co.	$139.00
ALF 9 Voice Board	$159.00
ALF 3 Voice Board	$229.00
System Saver by Kensington	$75.00
Microbuffer II 16K w/graphics	$259.00
Microbuffer II 32K w/graphics	$299.00
APPLE INTERFACE CARDS BY CCS	
Serial Asynch. #7710	$139.00
Centronics #7729	$149.00

Call for other CCS cards

RAM

16K Ram Kit for Apple II; TRS80 200 nano seconds, 4116 chips	$17.50

DEALER INQUIRIES PLEASE CALL 1-800-343-7036

COMPUTERS

CALIFORNIA COMPUTER SYSTEM	
Mainframe 2200a	$485.00
Z-80 CPU 2810a	$265.00
64K RAM 2065	$569.00
Floppy Controller 2422a	$359.00
ZENITH	
Z-89 48K	CALL
Z-90 64K	CALL
Z-100	CALL

Call For Prices On The Complete Zenith Line

CASIO FX702P Pocket Computer	$179.00
Sanyo MBC 1000 64K	CALL

Call For Prices On Complete Sanyo Computer Line

PRINTERS

NEC 3550 for the IBM PC	$2195.00
NEC 7710 Serial	$2395.00
NEC 7720 KSR	$2749.00
NEC 7730 Parallel	$2395.00
NEC 3510 Serial	$1850.00
NEC 3520	$2099.00
NEC 3530 Parallel	$1850.00
Antex "Generic Model of the Prowriter"	$479.00
Epson MX-80	CALL
Epson MX-80FT	CALL
Epson MX-100	CALL
IDS Micro Prism	CALL
IDS Prism 80	CALL
IDS Prism 132	CALL
Okidata Microline 80	CALL
Okidata Microline 82A	CALL
Okidata Microline 83A	CALL
Okidata Microline 84	CALL
Datasouth 180 cps	CALL

MONITORS

SMD 13" Color	$329.00
Sanyo 9" B & W	$135.00
Sanyo 9" Green	$140.00
Sanyo 12" B & W	$179.00
Sanyo 12" Green	$189.00
Sanyo 13" Color	$359.00
Zenith 12" Green	$95.00
Zenith 13" Color	$339.00
Electrohome 13" HI-RES Color Monitor	$829.00
Electrohome 13" Color	$349.00
Electrohome 12" B&W	$179.00
Electrohome 12" Green	$189.00
Electrohome 9" B&W	$149.00
Electrohome 9" Green	$159.00

SPECIAL OF THE MONTH
SMD 13" COLOR MONITOR $329.00

TERMINALS

ADDS Viewpoint	$495.00
Zenith Z-19	$679.00
Televideo 910	$595.00
Televideo 925	$779.00
Televideo 950	$969.00
Zenith ZT-100	$595.00

TELECOMMUNICATIONS

Novation Cat Modem	$139.00
Novation D-CAT	$149.00
Novation AUTO-CAT	$199.00
Novation APPLE CAT	$299.00
Hayes Smart Modem	$249.00
Smart Modem 1200	CALL
Hayes Micro-Modem	$295.00
Hayes Chronograph	$225.00
Signalman Mark I	$85.00

The CPU Shop

TO ORDER CALL TOLL FREE 1-800-343-6522

420-438 Rutherford Ave., Dept. CR13, Charlestown, Massachusetts 02129

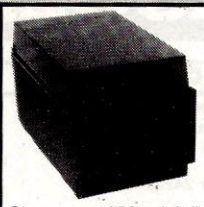
Hours 9 AM – 9 PM (EST) Mon.-Fri. (Sat. till 6)
Technical information call 617/242-3361

TWX- 710-348-1796

Massachusetts Residents call 617/242-3361
Massachusetts Residents add 5% Sales Tax

CIRCLE 153 ON READER SERVICE CARD

SUPER VALUES



MINI DISK TRAY

Store over 130 mini-disks in their protective jackets. Each plastic tray includes a smoke dust cover and six plastic movable index dividers.
SIZE: 6"x6"x12"
COLORS: Black or putty
ADD'L DIVIDERS: $4.95/6 pack.
PRICE: ~~$29.95~~ $24.95

apple software

GIN RUMMY: The APPLE is good in this superb HI-RES game! **$16.95**

OTHELLO: Nine skill levels makes this fast HI-RES game fun! **$17.95**

BLACKJACK: Up to four players can challenge the APPLE in this fast HI-RES game. **$14.95**

STATES & CAPITALS: Learn them with the aid of a HI-RES map. **$13.95**

MEMORIZER: HI-RES objects are used to challenge the players memories. **$15.95**

SPEED READING: Read it fast! It self-adjusts to your skills. **$14.95**

UPDATE 3.2/3.3: Your 3.2 disk is updated in seconds to boot on both 3.2 and 3.3. **$17.95**

VISIFORM: Lists VISICALC grid locations and their formulas. A MUST for VISICALC users! **$17.95** *

CATALOGUER: Organize your disk library by program name automatically! Sort, search, add titles, comments, etc. It includes a powerful editor! **$18.95** *

HI-RES DRAWING: Draw HI-RES screens from game boards to business charts. Has 50 different size brushes or define & use your own brushes! **$17.95**

HI-RES SHAPE GENERATOR: Create & EDIT shape tables for use in your programs. It's easy to use! **$15.95**

CONCENTRATION: Challenge your memory in this beautiful HI-RES card-matching game! **$10.95**

BACKGAMMON: Strategy & odds makes this a great HI-RES game. **$16.95**

ROYAL CASINO: A HI-RES card game of considerable math skill. Great! **$15.95**

STUD POKER: You VS the APPLE in a HI-RES gambling game. It's fun! **$15.95**

CRIBBAGE: Six-card version in beautiful HI-RES. **$15.95**

UTILITIES I: Includes: AUTO-MENU, Sort Catalog, Change Volume Name and Short DOS Commands. **$16.95**

WORD SEARCH PUZZLE: Find the hidden word before time runs out. It's educational & fun! **$14.95**

SCRAMBLED WORDS: Clues help you to unscramble them in this timed educational game. **$14.95**

* Specify DOS 3.2 or DOS 3.3.
All programs are on disk.
Applesoft is required.

FREE SHIPPING
send check or money order to:

SoftwareLand

Tamiami Mall
8774 S.W. 8 Street
Miami, Fla. 33174
(305) 551-1111

CIRCLE 263 ON READER SERVICE CARD

Painless Graphics, continued...

Listing 3. SKETCH/PRINT

```
100 CLEAR2:DEFINTA-Z:DIMID(8)
105 REM ** LINES 110-150 PROVIDE INSTRUCTIONS
110 CLS:PRINTTAB(13)"SKETCH/PRINT BY JOHN CREW 12/24/81
"TAB(24)"GRAPHICS MODE
USE NUMERIC KEYPAD TO MOVE CURSOR AS SHOWN IN DIAGRAM.
USE THOSE KEYS WITH THE SHIFT KEY TO ERASE.
PRESS '.' TO SWITCH TO NONDESTRUCTIVE FLASHING CURSOR.":QA$="ALPHANUMERIC MODE"
120 QA$="ALPHANUMERIC MODE":PRINT"PRESS 'SHIFT .' TO RETURN TO NORMAL
CURSOR.
PRESS 'SHIFT "CHR$(93)"-' TO SWITCH TO
"QA$".
PRESS 'S' TO STORE CURSOR LOCATION.
PRESS 'D' TO AUTOMATICALLY DRAW A
LINE FROM THE STORED LOCATION TO THE
PRESENT LOCATION.
140 PRINT"PRESS 'E' TO DO SAME AS 'D' BUT ERASE.":PRINT@358,7TAB(50)8TAB(61)9;:P
RINT@550,4TAB(61)6;:FORY=18TO33:SET(103,Y):NEXT:FORX=82TO122:Y=.370079*(X-38):SE
T(X,Y+2):SET(X,25):SET(X,49-Y):NEXT:PRINT@562,5;:PRINT@806,1TAB(50)2TAB(61)3;
145 GOSUB420:CLS:PRINTTAB(23)QA$"

ALL PRINTABLE KEYBOARD CHARACTERS BUT LOWER CASE MAY BE USED.
150 PRINT"PRESS '"CHR$(93)"-' TO BACKSPACE AND ERASE LAST CHARACTER.
PRESS 'SHIFT -"CHR$(94)"' TO RETURN TO GRAPHICS MODE.

"TAB(27)"BOTH MODES

PRESS 'SHIFT CLEAR' TO ERASE THE SCREEN.
PRESS 'ENTER' TO GO TO GRAPHICS MANAGER (IF IT HAS BEEN ADDED).":GOSUB420
153 REM ** END OF INSTRUCTIONS. THE MAIN PART OF THE PROGRAM FOLLOWS. LINES 155-
160 SET VARIABLES TO INTITIAL VALUES, CLEAR THE SCREEN, AND SET A GRAPHICS BLOCK
 IN THE LOWER LEFT-HAND CORNER
155 CLS
160 QA=0:X=0:Y=47:X1=X:Y1=Y:F=0:SET(X,Y):T=9:GOSUB410
165 REM ** LINE 170 ERASES PART OF THE KEYBOARD BUFFER SO THE COMPUTER DOESN'T K
NOW CERTAIN KEYS WERE PRESSED BEFORE
170 FORQE=0TO2:POKEQE+16442,0:NEXT
175 REM ** THE "PEEK" STATEMENT IN LINE 180 RETURNS A 1 IF THE "SHIFT" KEY IS DE
PRESSED, OTHERWISE IT RETURNS 0
180 S=PEEK(14464):QA$=INKEY$:IFQA$=""THEN180ELSEN=ASC(QA$)
183 REM ** LINE 185 CONTAINS TESTS TO INTERPET KEYBOARD INPUT IN THE GRAPHICS AN
D ALPHANUMERIC MODES. MOST OF THAT LINE IS USED FOR ONLY THE GRAPHICS MODE
185 IFS=1ANDN=31THEN155ELSEIFQATHEN190ELSEIFN=24THENQA=7ELSEIFN=83THENX1=X:Y1=YE
LSEIFN=68ORN=69THEN195ELSEIFN=46THENF=7:GOTO380ELSEIFN=62THENF=0:GOTO380ELSEIF32
<NANDN<58THENN=N+48*(48<N)+32*(N<42):IFN<10THEN210
187 GOTO170
189 REM ** LINES 190-193 ARE USED ONLY FOR PRINTING A CHARACTER AND MOVING THE C
URSOR IN THE ALPHANUMERIC MODE
190 IFN=25QA=0:GOTO180ELSEIFN=8THENIF1<XTHENX=X-2ELSEIF2<YTHENY=Y-3:X=X+126
192 T=FIX(Y/3)*64+FIX(X/2)+15360:IFN=8THENPOKET,32ELSEIF31<NANDN<128THENPOKET,N+
32*(N>95):IFX<126THENX=X+2ELSEIFY<45THENY=Y+3:X=X-126
193 GOTO180
194 REM ** LINES 195-200 DRAW OR ERASE A LINE AUTOMATICALLY. IF THE REQUESTED LI
NE IS HORIZONTAL OR IF THE INTITIAL AND TERMINAL POINTS ARE THE SAME, LINES 195-
196 ARE USED. OTHERWISE, ONE OF THE TWO LOOPS IN LINES 197-200 DRAWS OR ERASES T
HE LINE
195 S=(N=68):IFY1<>YTHEN197ELSEFORN=X1TOXSTEPSGN(X-X1)-(X=X1):IFSTHENSET(N,Y)ELS
ERESET(N,Y)
196 NEXT:GOTO180
197 A!=ABS((X-X1)/(Y-Y1)):IFA!>1THEN199ELSEA!=SGN(X-X1)*A!:B!=X1:FORN=Y1TOYSTEPS
GN(Y-Y1):IFSTHENSET(B!+.5,N)ELSERESET(B!+.5,N)
198 B!=B!+A!:NEXT:GOTO180
199 A!=SGN(Y-Y1)/A!:B!=Y1:FORN=X1TOXSTEPSGN(X-X1):IFSTHENSET(N,B!+.5)ELSERESET(N
,B!+.5)
200 B!=B!+A!:NEXT:GOTO180
205 REM ** THE FOLLOWING IS USED IN THE GRAPHICS MODE TO CHECK THE REQUESTED DIR
ECTION. ALSO, IF THE MOVEMENT IS LEGAL, THE CURSOR IS MOVED AND A GRAPHICS BLOCK
 IS SET, RESET, OR FLASHED. LINES 210-220 SET ILLEGAL DIRECTION FLAGS.
210 FORQE=0TO8:ID(QE)=0:NEXT:IFX=0FORQE=0TO6STEP3:ID(QE)=7:NEXTELSEIFX=127FORQE=
2TO8STEP3:ID(QE)=7:NEXT
220 IFY=0FORQE=6TO8:ID(QE)=7:NEXTELSEIFY=47FORQE=0TO2:ID(QE)=7:NEXT
230 REM ** LINE 250, IF THE REQUESTED MOTION IS ILLEGAL, THE COMPUTER GOES BACK
FOR ANOTHER COMMAND. IF THE DIRECTION IS LEGAL, THE CURSOR MOVEMENT IS PERFORMED
 BY THE LAST PART OF LINE 250 AND BY LINE 260
250 IFID(N-1)THEN170ELSEIFN<4THENY=Y+1ELSEIF6<NTHENY=Y-1
260 IFN/3=FIX(N/3)THENX=X+1ELSEIF(N+2)/3=FIX((N+2)/3)THENX=X-1
330 REM ** NOW THAT THE CURSOR HAS BEEN MOVED, A BLOCK WILL BE SET, RESET, OR FL
ASHED. IF THE FLASHING CURSOR IS ON, LINE 340 DIVERTS PROGRAM EXECUTION TO LINE
380
340 IFFTHEN380ELSEIFSTHENRESET(X,Y)ELSESET(X,Y)
350 GOTO170
360 REM ** LINES 380-400 FLASH THE CURSOR AND GO BACK FOR A NEW COMMAND
380 S=POINT(X,Y):T=1:FORQE=0TO2:IFSTHENRESET(X,Y)ELSESET(X,Y)
390 GOSUB410:IFSTHENSET(X,Y)ELSERESET(X,Y)
400 GOSUB410:NEXT:GOTO170
405 REM ** LINE 410 IS A DELAY SUBROUTINE. LINES 420-430 CONTAIN A SUBROUTINE WH
ICH WAITS FOR A KEY TO BE PRESSED
410 FORQF=0TO10*T:NEXT:RETURN
420 PRINT@971,"PRESS ANY KEY BUT 'BREAK' TO CONTINUE";
430 IFINKEY$=""THEN430ELSERETURN
```

EPSON

MX 80 F/T III
MX 100 III – 100 CPS –
BOTH WITH GRAFTRAX

HX-20 COMPUTER

Cards and cables for all computers
Please Call For Best Prices

OKIDATA

82 A	$399.00
83 A	$649.00

BASIS 108

APPLE COMPATIBLE COMPUTER
CALL FOR LOWEST PRICE

16K RAM CARD

For **Apple®** II/II+
Compatible with:
Dos 3.3® CP/M®
Visicalc®, Pascal®,

2 Year Warranty
Fully tested and assembled

$59.00

SOFTWARE

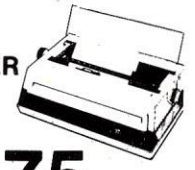
WE HAVE IT ALL!
OVER 500 TITLES
• APPLE • CP/M
• IBM • ATARI

PARTIAL LISTING

Applewriter II	$99.00
Arcade Machine	35.00
Bag of Tricks	$CALL
BPI GL	299.00
Choplifter	27.00
Data Factory	249.00
dBase II	489.00
DB Master	169.00
Executive Secretary	$CALL
Frogger	27.00
Home Accountant	59.00
Peachtree	$CALL
PFS	89.00
S.A.M.	$CALL
Screenwriter II	89.00
Supercalc	199.00
Versaform	285.00
Visicalc	179.00
Visifile	179.00
Wizardry	39.00
Word Handler	159.00
Wordstar	$CALL

SMITH-CORONA

LETTER QUALITY DAISY WHEEL PRINTER



$575

ATARI®

Atari 800 (48K)	$CALL
Atari 400 (16K)	299.00
Visicalc	179.00
LJK Letter Perfect	119.00
32K memory	79.00
Software & acces.	$CALL

HARDWARE

Disk Library Case	$2.50
Hayes Modems	$CALL
Lobo Drives	$CALL
Microsoft Softcard	259.00
Novation Modems	$CALL
Paymar Lower Case	23.00
Vista Products	$CALL
Wizard BPO	159.00
16K Ram 4116(8)	11.00
64K Ram 4164(8)	88.00
3-Ring Disk Sheets (10)	5.00

Mountain Computer

CPS Card	$149.00
CPS Cable	$CALL
Ramplus+ 32K	139.00
Rom Writer	139.00
Clock	195.00
Music System	299.00
Super Talker	149.00
Expansion Chassis	559.00
Card Reader	$CALL
A/D-D/A	269.00
V-C Expand	$CALL

Videx

80 Column	$239.00
Enhancer II	119.00
Softswitch	25.00
Function Strip	59.00
Inverse Video	19.00

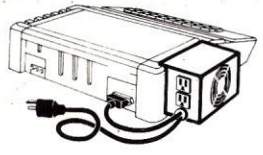
SATURN SYSTEMS

64K	$319.00
128K	459.00
V-C Expand 80	75.00

Verbatim

5 1/4" (100)	$239.00
5 1/4" (10)	25.95
8" (10)	39.95
Head Cleaning kit	7.50

KENSINGTON MICROWARE



SYSTEM SAVER
• UL Listed
• Surge
• Suppression
• Dual outlet

$65

TG Products

Paddles	$29.00
Joystick II	40.00
Select-A-Port	47.00
All of Above	109.00
Joystick III	$CALL
Joystick IBM	45.00

BMC

12" Green AU	$88.00
12" Green EU	129.00
Amber	$CALL
RGB (IBM)	$CALL
13" Color Composite	$269

μ-SCI

APPLE II

A2	DISK II Replacement	$299.00
A40 40 TRACK		359.00
A70 70 TRACK		479.00

APPLE III

A3	DISK III Replacement	$339.00
A73 70 TRACK		529.00
A143 140 TRACK		669.00

EPSON RIBBONS

MX 80	$10.00 ea or 3 for 25.00
MX 100	15.00 ea or 3 for 39.00

DEALER INQUIRIES INVITED

COMPUTER DISCOUNT PRODUCTS
(408) 985-0400

MAIL ORDERS & RETAIL STORE
860 S. Winchester Blvd.
San Jose, CA 95128
MON-FRI 8-5 SAT 10-4

Mail and phone orders welcome. CA residents add 6½% TAX. Prices subject to change. All items FOB San Jose VISA, MC, AMEX, MO, CASHIERS CHECK. COD OK. Personal checks allow 2 weeks for processing. Schools PO's accepted.

CHRISTMAS HOURS: MON-FRI 8AM - 7PM - SAT & SUN 10AM - 4PM

CIRCLE 139 ON READER SERVICE CARD

Each time you press a key which moves the cursor, the direction is checked to be sure that it will not move the cursor off the edge of the screen. If the direction is illegal, then the cursor movement command is ignored.

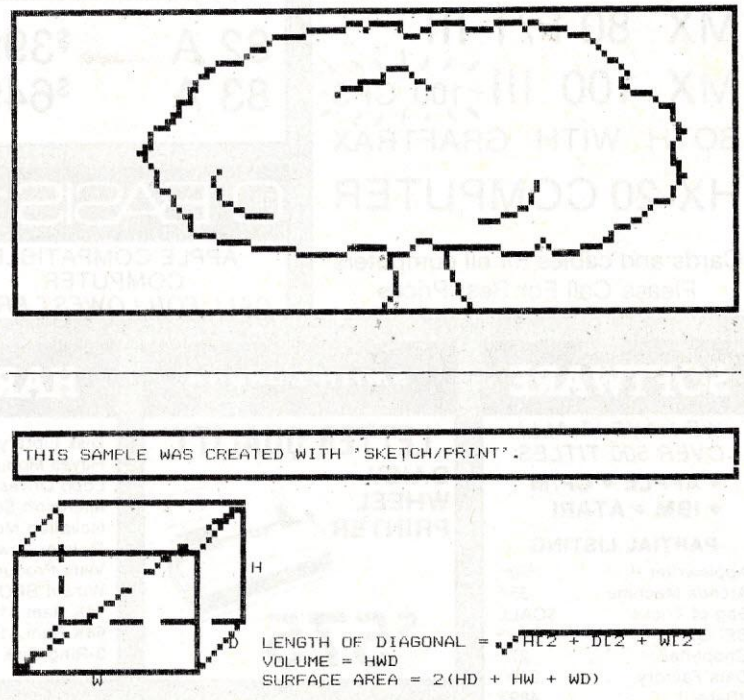
Holding the SHIFT key down while a numeric key is depressed will erase instead of turn on a block.

To move the cursor to a different position without erasing or drawing over existing graphics, press the decimal point key. This will switch to a flashing cursor which will not disturb your graphics characters, but you will have to be careful not to move through or under an alphanumeric character (which will be mentioned later in detail). To return to the normal cursor for the graphics mode, press the decimal point and the SHIFT keys simultaneously.

You can also draw and erase lines automatically while in graphics mode. Press the S key to store the current cursor location for later reference when automatically drawing lines. To draw a line from the last stored location to the present location, press the D key.

To erase a line from the last stored location to the present cursor location, press the E key. The stored location is initially set to the coordinates of the lower lefthand corner of the screen.

Two Sample Pictures Made with SKETCH/PRINT.



Switching Modes

To switch to the alphanumeric mode, press the SHIFT key and the ← key. To return to graphics mode, press the SHIFT key and the →.

The Alphanumeric Mode

In the alphanumeric mode you may type on the screen any displayable character which is accessible from the keyboard except the lower case letters. Listing 1 displays the characters which may be used. Any lower case letter which you use will be converted to upper case. The left arrow key may be used to backspace and erase the last character. You cannot go beyond the top or bottom of the screen.

Restrictions

There are two restrictions imposed on the program by the design of the Model I.

The first restriction is that, as noted above, lower case letters can't be used in the alphanumeric mode. This is because the unmodified Model I has only seven instead of eight bits for each location in the video memory (bit 6 is not stored). You will see a character with an ASCII number 64 less than the one you POKEd if you POKE a character with an ASCII code of 96-127 or 192-255. If you POKE an ASCII value less than 32, you will see a character with an ASCII number 64 greater than the POKEd code.

Line 192 contains the POKE statement which puts an alphanumeric character into video memory and also converts lower case letters to upper case. If you have a working lower case modification, you may want to modify this program to allow lower case letters. I believe that the only change needed is to use the EDIT mode of Level II to delete +32*(N>95) from the second POKE statement in line 192.

The second restriction is that you can't move through or immediately under an alphanumeric character while you are in the graphics mode of Sketch/Print. This is because the Model I has character graphics instead of a separate display mode for graphics such as the Color Computer has.

On the Color Computer you could write a program to draw alphanumeric characters while in one of the high resolution graphics modes, so you could freely draw over the alphanumeric characters. But, alas, on the Model I you are restricted to the characters listed in the C appendix of the Level II reference manual.

The only way to make two characters on the screen appear to overlap is to flash them alternately at high speed, a trick which this program cannot accomplish.

There are 1024 character positions on the Model I screen. Each position can hold either an alphanumeric character or a graphics character. Alphanumeric characters have a blank space below them while graphics characters may fill a character position. The blank space under an alphanumeric character is part of that character.

If you try to SET a point in a position which is occupied by an alphanumeric character, that alphanumeric character will be replaced by a graphics character. Because each alphanumeric character has a blank space below it which is associated with that character, you can't set a point in the blank space below the alphanumeric character.

Program Notes

I wanted the keys which move the cursor in the graphics mode to repeat. This can be accomplished in two ways: by writing a keyboard scan subroutine either in Basic using PEEK statements or in machine language, or by erasing the keyboard buffer used by Level II and using the INKEY$ function to scan the keyboard. I used the second method.

Level II maintains a buffer which contains a record of the last keys pressed. It occupies positions 16438-16444 in memory. This buffer is referred to after the keyboard has been scanned so the computer can determine which *new* key has been pressed. This provides key-

GREAT THINGS TO MAKE YOUR APPLE™ GROW

LOCK SMITH™ Our new 4.1 version is by far the most reliable nibble-copy program for the Apple™. There simply *is* no competition. Allows you to backup just about *any* diskette. Includes read/write Nibble Editor, Quickscan Analysis, Media Surface Check, Degauss and Erase, Inspector Interface and Disk-drive Speed Calibration utilities. All for just $99.95 at your local dealer or direct.

™ Puts all your disk and memory utilities together where they belong — *inside* your Apple. Eprom or disk version is always at your fingertips. Search memory and disks forward and backwards, read nibbles map disk space, locate strings, the uses are endless. At your local dealer or direct — THE INSPECTOR, $59.95.

Watson™ Includes such goodies as scrolling screen dump, disassembler that shows ASCII, file follower of file, track/sector list-finder by *name*, disk-sector lockout, disk comparer, much more. At your local dealer or direct — WATSON, $49.95. Requires The Inspector.

RAMEX-16™ *(Look Ma, no straps!)* The one 16K memory expansion card for your Apple that *requires no unnecessary surgery.* This board just plugs in with no strap or additional connections. In spite of its quality, the Ramex-16™ costs just $139.95, complete with a *one year* limited warranty.

night falls™ is an exciting arcade style game that tests your ability to survive the invasion. Fight off the aliens each night and rebuild your city during the day. See how many nights you can survive. $29.95

RAMEX-128™ Adds 128k of additional RAM to your Apple. Used with VisiCalc™ and Super Expander™ to increase work space to 136k. Imagine LOADing a full 136k VisiCalc file into memory in 20 seconds, SAVEing it back in 20 seconds and spending your time working on the template instead of waiting 15-20 minutes as required with other large memory cards. Also included is disk emulation software that adds 8 new commands to DOS as well as super fast LOAD and SAVE of an entire disk. Memory management is also provided to relocate DOS to the card as well as relocating the alternate BASIC. Requires no strapping to the mother board! Works with 16k card as well as alone. And the best part is the low $499.00 price!

SUPER EXPANDER™

is a VisiCalc™ preboot utility that allows up to 136k files using the RAMEX 128. Adds new commands to VisiCalc for super fast (20 second) LOAD and SAVE of files. Just $64.95 — requires RAMEX 128.

A complete turnkey system of memory management on a disk — using either one or two 16K cards. HIDOS™ loads DOS onto one RAM card and with the second card loads an alternate language onto another. SOLIDOS™ turns a 16K card into a fast, 45-sector disk-drive emulator. At your local dealer or direct for just $34.95.

If you use VisiCalc™, then you must have THE CONSOLIDATOR. It will save you hours of keyboard time, by allowing you to manipulate totals of separate files *without reentering them.* Easy to use, invaluable to own. Just $49.95 at your dealer or direct.

OMEGA MICROWARE, INC. T.M.
222 So. Riverside Plaza
Chicago, IL 60606
312-648-4844

Charge your Visa or MasterCard
Toll-free
1-800-835-2246

Apple is a registered trademark of Apple Computer, Inc.
VisiCalc is a registered trademark of Personal Software, Inc.

CIRCLE 219 ON READER SERVICE CARD

Figure 2. Variables Used By Sketch/Print

Type	Name	Primary Use(s)
Integer	X	x-coordinate of cursor (0-127)
	Y	y-coordinate of cursor (0-47)
	QA	Alphanumeric mode flag
	F	Flashing cursor submode flag
	S	Shift key flag, temporary storage
	T	Temporary storage. Used as parameter to set length of time delay and to hold address of cursor in alphanumeric mode
	QE	Loop counter
	QF	Loop counter in delay subroutine
	N	VAL(QA$). A number, 1-9, indicating the direction of movement.
	X1	x-coordinate of stored location used as initial point in line-drawing submode.
	Y1	y-coordinate of stored location used as initial point in line-drawing submode.
	ID(0-8)	Illegal direction flags. Position 4 is always zero.
Single precision	A	Used in line-drawing calculations
	B	Used in line-drawing calculations
Character string	QA	Used for INKEY$ loop. It holds the character obtained from the keyboard.

board rollover without elaborate hardware.

If zeroes are POKEd into the keyboard buffer, the computer does not know which keys were previously pressed and recognized. For a more complete description of how the keyboard is used by Level II see the book by William Barden which I mentioned earlier.

You may wonder why I used POKE instead of PRINT@ to put a character on the screen. I used POKE because even if you put a semicolon at the end of a PRINT@ statement the screen will scroll when you put a character at position 1023 (the lower righthand corner of the screen).

The multiple IF-THEN-ELSE statements in Sketch/Print are used to avoid using many GOTO statements to jump past the long list of tests. Using lines which have multiple IF-THEN-ELSE statements saves memory and makes the program run fast. Also, a program written that way will appeal more to programmers who like structured programs.

When you write multiple IF-THEN-ELSE statements on one program line, remember to put the highest priority IF-THEN tests first, and, if the logic is complex, make a flowchart.

One of the biggest problems I encountered in writing Sketch/Print was finding an efficient way of testing which directions of motion in the graphics mode were illegal. There are eight different illegal cases. Four of them occur when the cursor is in a corner of the screen. The other four occur when the cursor is at one edge of the screen but not in a corner.

At first I thought eight IF-THEN statements would be needed, but later I thought of a clever method that required only three IF-THEN-ELSE statements. An array with nine elements named ID is used to hold flags which indicate which directions are illegal. Each position in the ID array corresponds to a key in the numeric keypad. The fifth position in the array corresponds to the 5 key which does not move the cursor so it is never an illegal direction.

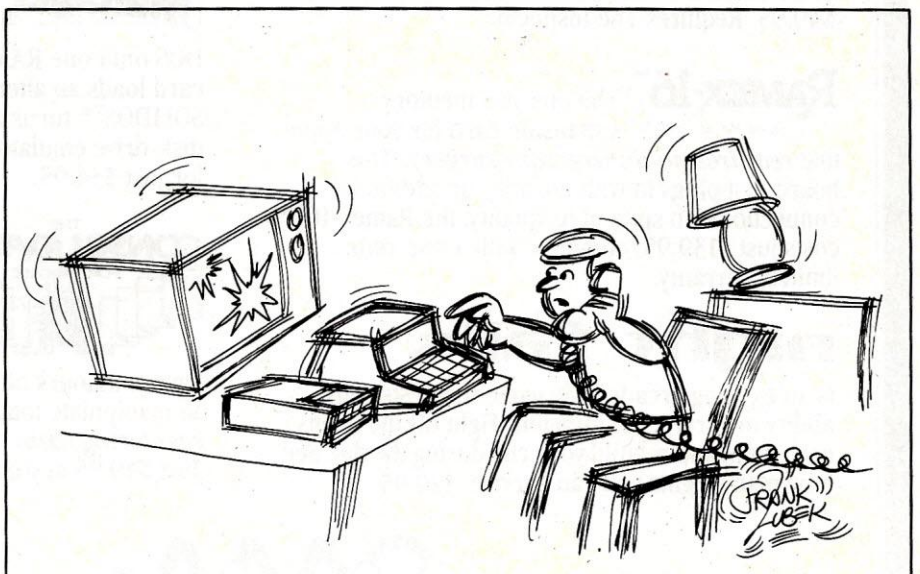
The IF-THEN-ELSE statement in line 210 checks to see if the cursor is at the left or right edge of the screen and if one of those situations exists, sets appropriate flags indicating which horizontal directions are illegal.

The IF-THEN-ELSE statement in line 220 checks to see if the cursor is at the top or bottom of the screen, and, if one of those situations exists, sets appropriate flags indicating illegal vertical directions.

In line 250, the direction of motion you request is compared with the list of illegal directions. If the direction is illegal, the computer goes back (to line 170) and awaits your next command. When the cursor is in a corner one illegal direction flag is set by both the test for illegal horizontal directions and the test for illegal vertical directions. That is a minor inefficiency.

If you plan to modify Sketch/Print or want to learn how it works, look at Figure 2 which lists the variables used in the program.

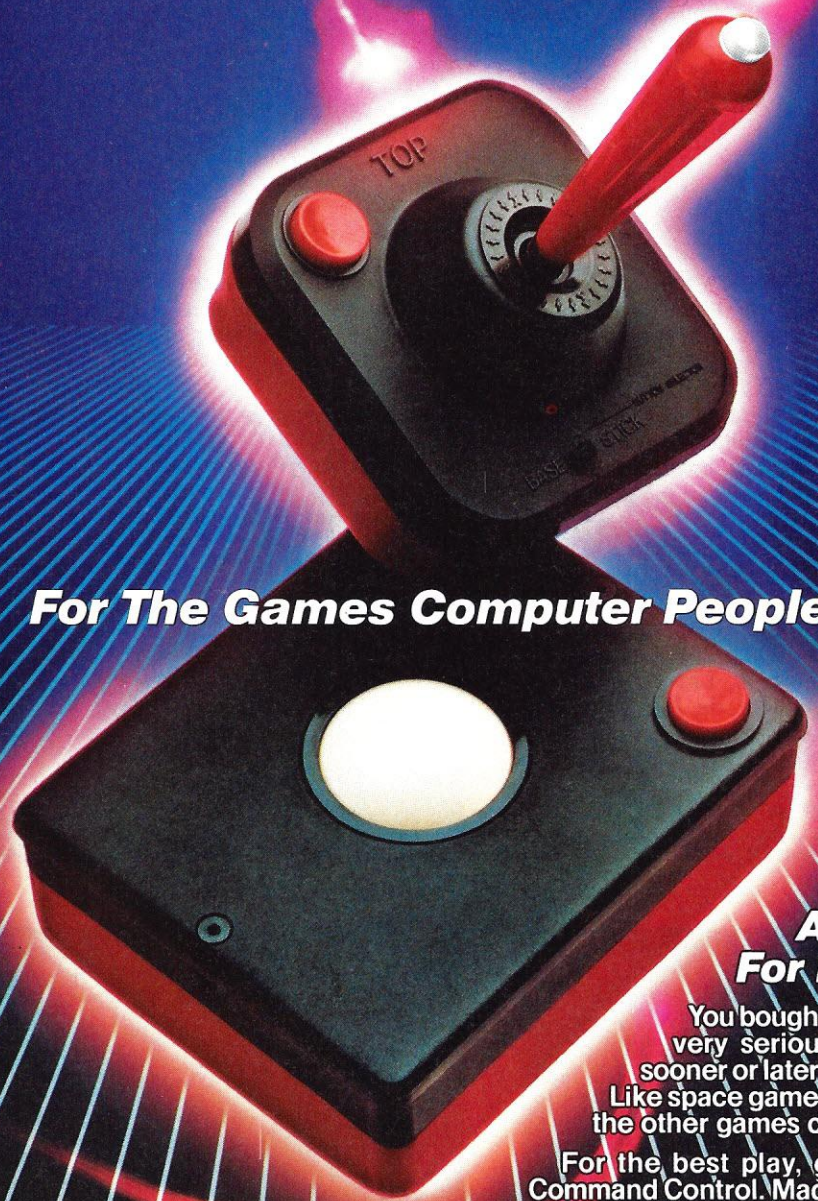
You might want to modify Sketch/Print so it would do one, several, or all of the following functions on command: reverse graphics; draw a border; scroll the screen left, right, up, or down; or automatically draw a triangle, rectangle, ellipse, circle, or other figure. □



"I'll have to call you back—I'm in the middle of a war!"

WICO

COMMAND CONTROL™



For The Games Computer People Play

The Only Arcade Controls For Home Computers.

You bought your home computer for some very serious reasons. But we know that sooner or later you'll have more on your mind. Like space games ... and chase games ...and all the other games computer people play.

For the best play, get the best controls; WICO Command Control. Made by the world's largest manufacturer of controls for the commercial arcades, Command Control joysticks and trackballs give you arcade excitement, arcade precision, arcade durability. Command Control joysticks and trackballs work with 10 different home computers and video game systems. Get yours today.

WICO Consumer Division • Niles, IL 60648
800-323-4014 • (Ill. residents call 312-647-7500)

Wico is a registered trademark of WICO Corporation. © 1982 Wico Corporation

CIRCLE 311 ON READER SERVICE CARD

Colorful Circles

Alan Foxx

Circle Fill is a program designed to allow the Apple II to fill in circles. See Listing 1. The program first draws a circle, saving each point into two arrays. The x-coordinate of each point is saved in the array AX. The y-coordinate of each point is saved in the array AY.

For example, the x-coordinate of the first point is saved in AX(1). The y-coordinate of the first point is saved in AY(1). The x-coordinate of the second point is saved in AX(2). The y-coordinate of the second point is saved in AY(2) and so on.

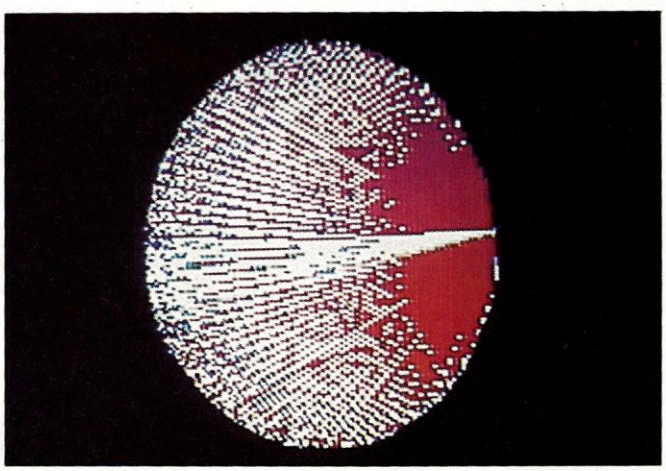
The outer perimeter of the circle is composed of 100 dots (see Figure 1), therefore AX(100) and AY(100) contain the value of the coordinates of the 100th and last dot.

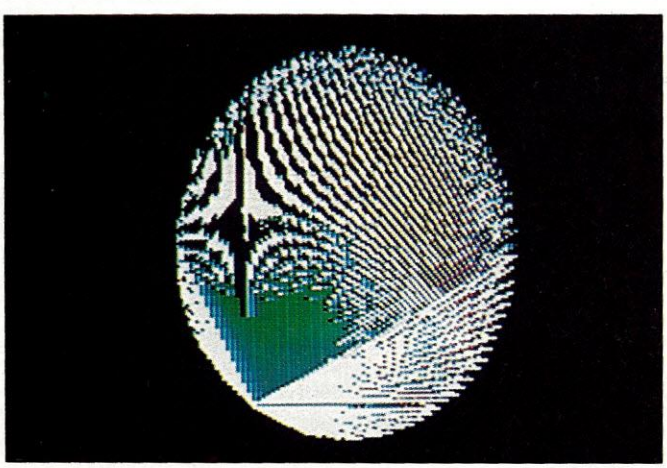
After drawing the circle, the program fills the circle in. It accomplishes this by connecting each dot on the outer perimeter of the circle to all the others. Lines are drawn connecting the first dot to the second dot, the first dot to the third dot, the first dot to the fourth dot and so on. This routine occurs in lines 230 thru 260. To speed up this process you may change line 230 to read:

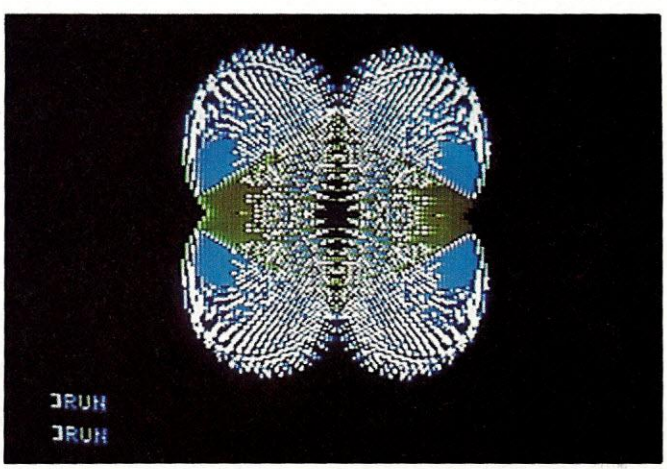
230 FOR J = 1 TO 100 STEP 10

Alan Foxx, 28090 Tavistock Trail, Southfield, MI 48034.

You may want to make some changes in the program. For example, to change the color of the circle, change line 120. To change the diameter of the circle change the value of







January 1983 © Creative Computing

California Accessory Warehouse

We will beat any advertised price!

- Free freight on all items listed
- Most orders shipped same day
- Open 7 days a week
- MasterCard, Visa, Personal Check, Money Order or C.O.D.
- Call for programs not listed

DISCOUNT COMPUTER ACCESSORIES

ATARI®

Atari is a Registered Trademark of Atari Inc.

NAME	*	PRICE
ACTION QUEST	DK	$25
ALI BABA & 40 THIEVES	DK	28
APPLE PANIC	DK	25
ASSEMBLER EDITOR	CT	50
CANYON CLIMBER	DK	25
CENTIPEDE BY ATARI	CT	38
CHOPLIFTER	DK	30
CLOWNS AND BALLOONS	CS	25
COMMBAT	DK	21
CROSSFIRE	DK	25
CRUSH, CRUMBLE, CHOMP	DK	$25
CRYPT OF THE UNDEAD	DK	34
CRYPTS OF TERROR	DK	30
CYCLOD	DK	25
DATA PERFECT	DK	85
DEADLINE	DK	42
DELUXE INVADERS	CT	34
FILE MANAGER 800	DK	85
FROGGER	CS	30
GHOST ENCOUNTERS	DK	25
GHOST HUNTER	CS	30
GORF	CT	42
HOME FILING MGMT	DK	42
INVIT. TO PROG. 1	CS	21
INVIT. TO PROG. 2	CS	$25
INVIT. TO PROG. 3	CS	25
JAWBREAKER	CS	25
JOYSTICK by ATARI	AC	19
JOYSTICK by WICO	AC	25
K-RAZY ANTIKS	CT	42
K-RAZY SHOOTOUT	CT	42
K-STAR PATROL	CT	42
LETTER PERFECT	DK	127
MARCO ASSEM & TEXT	DK	76
MASTER TYPE	DK	34
MICROSOFT BASIC	DK	76
MOON BASE	CS	25
NAUTILUS	DK	30
NIGHTMARE	DK	25
PAC MAN BY ATARI	CT	34
PACIFIC COAST HWY	CS	25
PREPPIE	DK	25
PROTECTOR	CS	25
RASTER BLASTER	DK	25
REAR GUARD	DK	21
S.A.M.	DK	$50
SHAMUS	DK	30
SLIME	CS	30
SNEAKERS	DK	26
SOFTPORN ADVENTURE	DK	25
SPACE EGGS	DK	25
TECH USER NOTES	BK	25
TELECOM	DK	72
TEMPLE OF APSHAI	DK	34
TEXT WIZARD	DK	84
THE UP REACH APSHAI	CS	17
THRESHOLD	DK	34
TRACK ATTACK	DK	25
ULTIMA I	DK	34
ULTIMA II	DK	44
VISICALC	DK	185
WAY OUT	DK	34
WIZARD AND PRINCESS	DK	26
WIZARD OF WOR	CT	42
ZORK 1	DK	32
ZORK 2	DK	32

apple®

Apple is a Registered Trademark of Apple Computer Inc.

NAME	*	PRICE
ALIBABA & FORTY THIEVES	DK	$28
ALPHA PLOT	DK	34
APPLE MECHANIC	DK	25
APPLE PANIC	DK	25
APPLEWRITER PRE-BOOT	DK	17
ARCADE MACHINE	DK	38
ATLANTIS	DK	34
BAG OF TRICKS	DK	34
BANDITS	DK	30
CANNONBALL BLITZ	DK	30
CANYON CLIMBER	DK	25
CASTLE WOLFENSTEIN	DK	25
CHOPLIFTER	DK	30
COMMBAT	DK	21
CRANSTON MANOR	DK	30
CROSS FIRE	DK	25
CRUSH, CRUMBLE, CHOMP	DK	25
CYCLOD	DK	25
D.B. MASTER	DK	183
DATA CAPTURE 4.0	DK	55
DAVIDS MIDNIGHT MAGIC	DK	30
DB MASTER UTIL PAK 1	DK	84
DB MASTER UTIL PAK 2	DK	84
DBASE II	DK	549
DEADLINE	DK	42
DOS BOSS	DK	20
ELECTRIC DUET	DK	25
ENHANCER II	AC	127
EZ PORT	AC	21
1ST CLASS MAIL	DK	$64
FLIGHT SIMULATOR	DK	28
FROGGER	DK	28
GAME PADDLES by TG	AC	34
GRAFORTH II	DK	64
GRAPHIC SYSTEM	DK	59
GRAPHICS MAGICIAN	DK	51
GORGAN	DK	34
HOME ACCOUNTANT	DK	64
HORIZON V	DK	30
JAWBREAKER	DK	25
JOYSTICK by TG	AC	48
KABUL SPY	DK	30
KNIGHTS OF DIAMONDS	DK	30
LETTER PERF W/MAILMERG	DK	127
MAGIC WINDOW	DK	85
MAGIC WORDS	DK	59
MAILMERGE	DK	106
MARAUDER	DK	30
MASTER TYPE	DK	34
MICRO MODEM II	AC	320
MICROSOFT SOFT CARD	AC	659
MICROWAVE	DK	$30
OLYMPIC DECATHLON	DK	25
PFS: GRAPH	DK	106
PFS: PER FILING SYS	DK	106
PFS: REPORT	DK	81
PIE WRITER STD	DK	127
PINBALL	DK	25
RAM CARD	AC	166
RASTER BLASTER	DK	23
REAL ESTATE ANALYZER II	DK	165
RENDEZVOUS	DK	34
ROBOT WAR	DK	34
S.A.M.	DK	110
SARGON II	DK	30
SCREENWRITER 2	DK	110
SENSIBLE SPELLER	DK	106
SERPENTINE	DK	30
SNACK ATTACK	DK	25
SNEAKERS	DK	26
SOFT VIDEO SWITCH	AC	30
SOFTCARD	AC	336
SPELLSTAR	DK	170
STAR BLAZER	DK	$27
SUPER CALC	DK	250
SUPER TEXT 40/80	DK	128
SWASHBUCKLER	DK	30
SYSTEM SAVER	AC	76
TARGET PLANNER CALC	DK	43
TAX PREPARER '82	DK	127
TEMPLE OF APSHAI	DK	32
THRESHOLD	DK	33
TWERPS	DK	25
ULTIMA	DK	32
ULYSSES & GOLDEN FLE	DK	30
UTILITY CITY	DK	25
VERSAFORM	DK	330
VIDEOTERM	AC	293
VISICALC PRE-BOOT	DK	42
VISICALC 3.3	DK	198
VISICALC 80 COL PRE	DK	42
VISIFILE	DK	212
VISITERM	DK	85
VISITREND/VISIPLOT	DK	255
WAY OUT	DK	34
WIZARD AND PRINCESS	DK	28
WIZARDRY	DK	42
WORDSTAR	DK	268
ZOOM GRAFIX	DK	34
ZORK	DK	34
ZORK 1	DK	34
ZORK 2	DK	32

Radio Shack® TRS-80®

TRS-80 is a Registered Trademark of the Radio Shack Division of Tandy Corporation

NAME	*	PRICE
ATTACK FORCE	DK	$17
B-1 NUCLEAR BOMBER	CS	14
COSMIC FIGHTER	DK	17
CRUSH, CRUMBLE, CHOMP	DK	25
CURSE OF RA	DK	17
DEFENCE COMMAND	DK	17
ELIMINATOR	DK	21
EMPIRE OF OVERMIND	DK	30
FLIGHT SIMULATOR	CS	28
GALAXY INVASION	DK	17
LUNER LANDER	DK	18
METEOR MISSION II	DK	17
MIDWAY CAMPAIGN	CS	14
OLYMPIC DECATHLON	DK	25
PENETRATOR	DK	$21
ROBOT ATTACK	DK	17
SARGON II	DK	30
SCARFMAN	DK	17
STARFLEET ORION	DK	21
STARFLIGHT-STAR TREK	DK	17
STELLAR ATTACK	DK	17
STELLAR ESCORT	CS	14
SUPER NOVA	DK	$17
TEMPLE OF APSHAI	DK	34
TYPING TUTOR	CS	17

* TYPE KEY:
AC ACCESSORY
BK BOOK
CS CASSETTE
CT CARTRIDGE
DK DISK

Order toll-free 1-800-241-2222

Inside California and Customer Service call 1-213-781-3828

No sales tax! (except California residents add 6.5%)

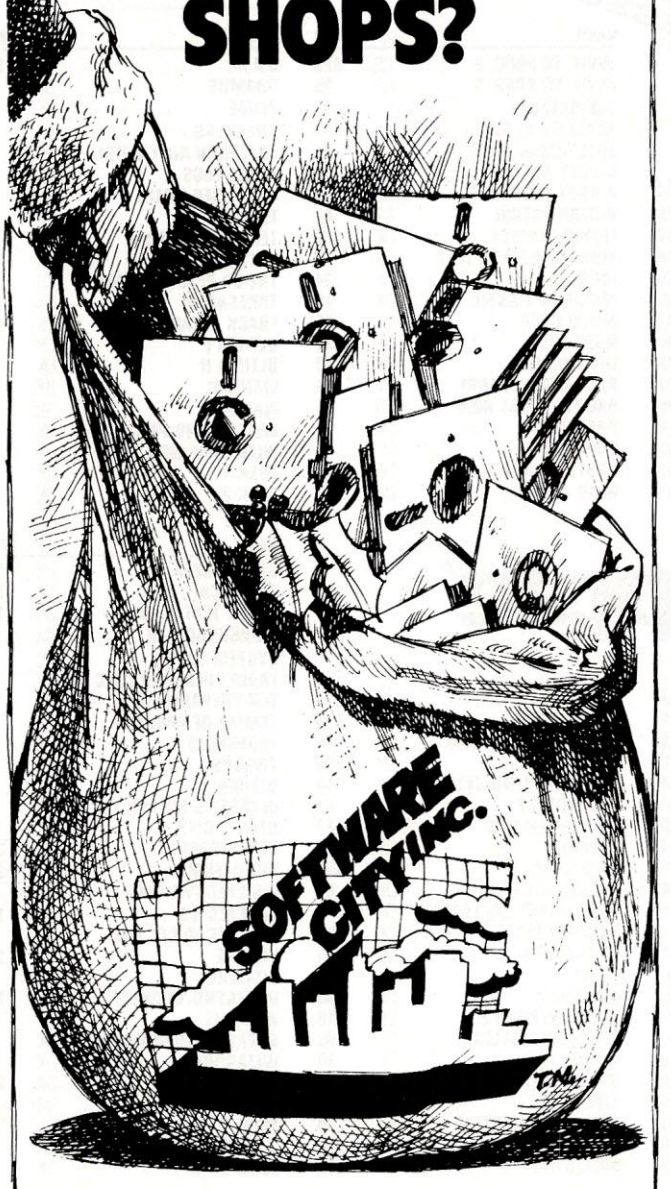
VISA MasterCard

To order by mail send Check or Money Order or call for faster service and use your MasterCard or Visa. When ordering, state make and model of machine and choice of disc, cartridge or cassette

California Accessory Warehouse
6726 Van Nuys Blvd., Van Nuys CA 91405

CIRCLE 126 ON READER SERVICE CARD

GUESS WHERE SANTA SHOPS?



CALL US! 1-800-845-5147

FREE CATALOG

Software City, Inc. • PO Box 12283 • Columbia, SC 29211

CIRCLE 260 ON READER SERVICE CARD

Colorful Circles, continued...

DIAM in line 130. To move the circle to another position on the screen, change the variables XP and YP in line 130.

One word of caution: the entire circle must be on the screen. Therefore do not make the circle too big or you will get an illegal quantity error in line 200.

To make an ellipse change line 180 to read:

180 AX(C) = R * SIN (J) / 3 + XP

or change line 190 to read:

190 AY(C) = R * COS (J) / 3 + YP

Figure 1. Circle before fill-in.

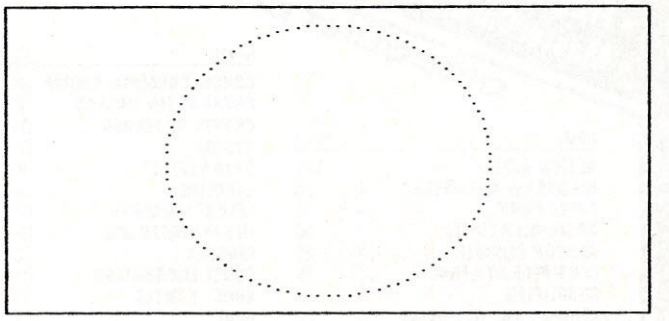
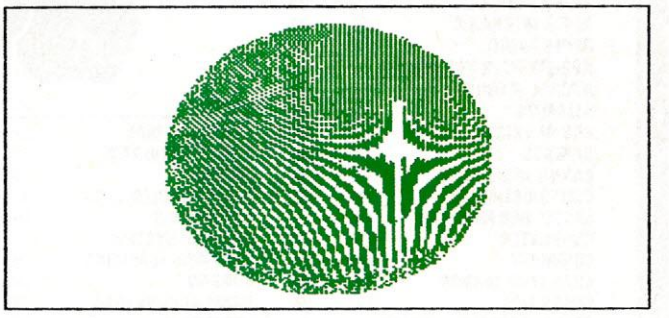
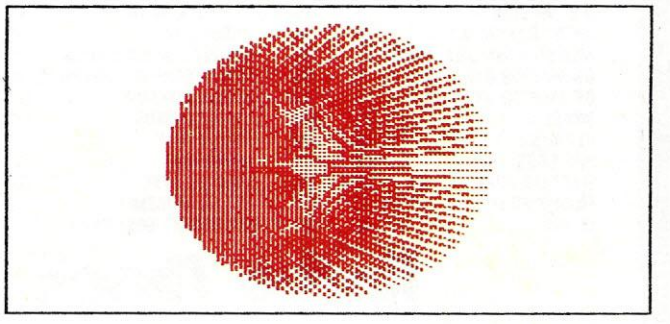
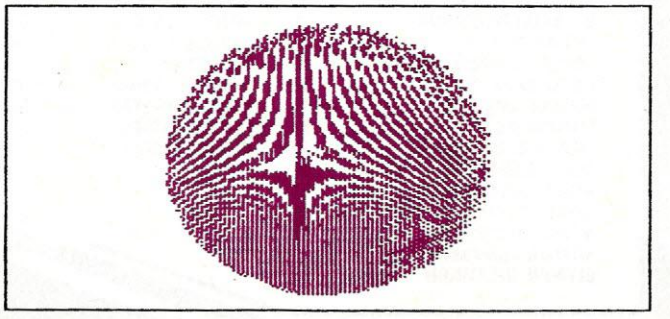


Figure 3.
Examples of what the Colorful Circle program can do.







The Colorful Circle

The Colorful Circle program in Listing 2 produces some very interesting patterns using the circle formula, and the random number generator.

Like Circle Fill, this program draws a circle with 100 dots and saves each dot into two arrays. Then, changing colors each time, lines are drawn connecting each dot to every other dot to produce interesting patterns. Figure 3 shows some examples of what this program can do.

Figure 2. Circle after fill-in.

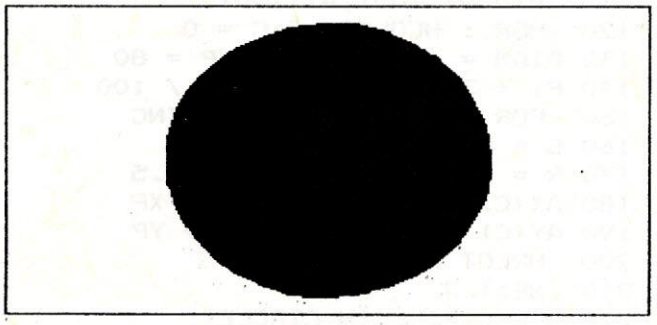
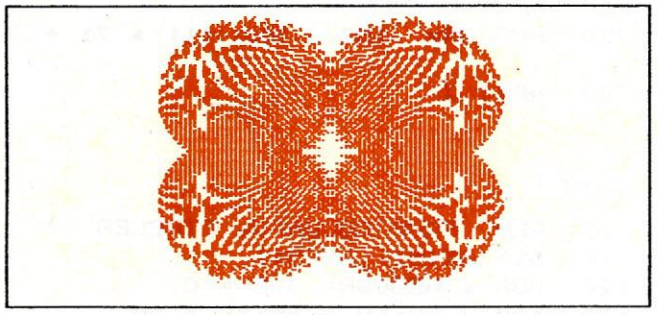
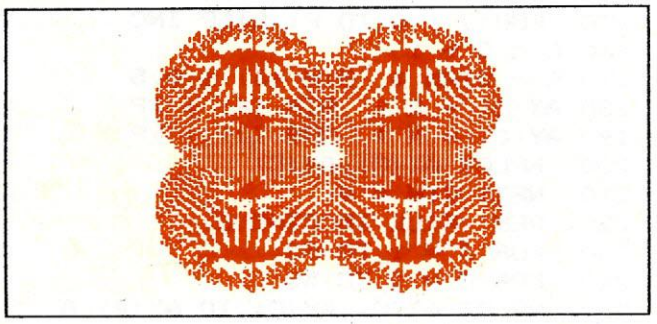
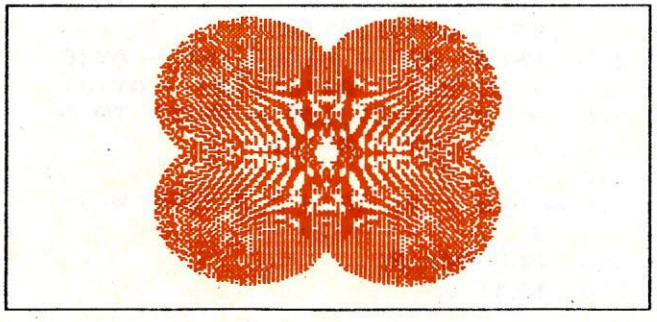


Figure 4.
Examples of what the Four Colorful Circles program can do.







SCRG Presents

FOR YOUR APPLE™ II OR II+

THE $79.95 NUMERIC KEYPAD

THE KEYPAD

- Converts APPLE™ keyboard to one of eight 10-key or hexadecimal keypads
- Hardware conversion—compatible with **ALL** software • Decals provided
- Works with any revision APPLE™ II or II+
- Instantly switches between standard keyboard and keypad • Custom layouts available
- Installs easily, no soldering
- Lowest priced numeric keypad available—**$79.95**

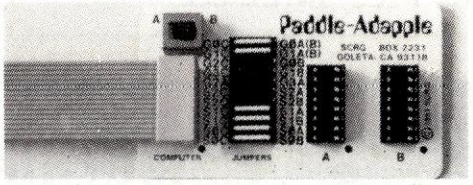
THE MAGIC KEYBOARD

Everything That **THE KEYPAD** Gives You, Plus . . . .

- At the flip of a switch, select between standard "QWERTY" keyboard and your choice of **DVORAK, A.S.K., MONTGOMERY, LEFT & RIGHT ONE-HANDED,** and **ALPHABETICAL ORDER**
- Easy modification and optional PROM allows true upper/lower case entry.
- **$89.95**

Paddle-Adapple

I/O EXPANSION ADAPTOR



- Works with all Apple compatible joysticks and paddles
- Unique "Jumpers" socket allows you to configure to meet your needs.
- Select one of two devices or
- Use 4 paddles simultaneously
- BPI™ users can have BPI™ device and paddles plugged in simultaneously.
- Gives you four push-button inputs
- Supports shift key modification
- Exchange X & Y joystick axis
- Small and compact—adheres to computer with supplied foam tape
- All strobes, annunciators and power available on both connectors
- **LOW PRICE—$29.95**

9 CARDS AND 8 SLOTS?

The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The **EXTEND-A-SLOT** works well with all slow to medium speed cards, such as Modems, Printers, Clock, Music, etc. It is not recommended for high speed data transfer devices such as disk drive controller cards. **$29.95**

All these fine products come with a 90 day warranty

Available at your local dealer or direct from:

SOUTHERN CALIFORNIA RESEARCH GROUP
Post Office Box 2231 · C
Goleta, CA 93118
(805) 685-1931

Add $2.50 for shipping:
CA and MA add tax

VISA, MASTERCARD accepted

Apple is a trademark of Apple Computers
BPI is a trademark of BPI Systems

CIRCLE 269 ON READER SERVICE CARD

Colorful Circles, continued...

Four Colorful Circles

The Four Colorful Circles program in Listing 3 is very similar to the Colorful Circle program. It incorporates the following changes: Instead of one circle there are now four on the screen, and the number of dots is decreased from 100 to 50. Another change was that the colors are only 1 and 2 (green and blue) instead of random.

The program uses a symmetry algorithm. In other words, when the computer plots a dot at (x,y) it will also plot three more dots at (279-x,y), (x,159-y), and (279-x,159-y). Figure 4 shows some examples of what the Four Colorful Circles program can do. □

Listing 1.

```
100  REM  CIRCLE FILL
110  DIM AX(100),AY(100)
120  HGR : HCOLOR= 3:C = 0
130 DIAM = 140:XP = 70:YP = 80
140 PI = 3.14159:INC = PI / 100
150  FOR J = 0 TO PI STEP INC
160 C = C + 1
170 R = DIAM *  SIN (J) + 0.5
180 AX(C) = R *  SIN (J) + XP
190 AY(C) = R *  COS (J) + YP
200  HPLOT AX(C),AY(C)
210  NEXT J
220  REM  FILL IN CIRCLE
230  FOR J = 1 TO 100 STEP 3
240  FOR C = J TO 100
250  HPLOT AX(C),AY(C) TO AX(J),A
     Y(J)
260  NEXT : NEXT
```

Listing 2.

```
100  REM  COLORFUL CIRCLE
110  DIM AX(100),AY(100)
120  HGR : HCOLOR= 3:C = 0
130 DIAM = 140:XP = 70:YP = 80
140 PI = 3.14159:INC = PI / 100
150  FOR J = 0 TO PI STEP INC
160 C = C + 1
170 R = DIAM *  SIN (J) + 0.5
180 AX(C) = R *  SIN (J) + XP
190 AY(C) = R *  COS (J) + YP
200  HPLOT AX(C),AY(C)
210  NEXT J
220  REM  FILL IN CIRCLE
230  FOR J = 1 TO 100
240  FOR C = 1 TO 100
250  HPLOT AX(C),AY(C) TO AX(J),A
     Y(J)
260  NEXT C
270  HCOLOR=  INT ( RND (1) * 7) +
     1
280  NEXT J
```

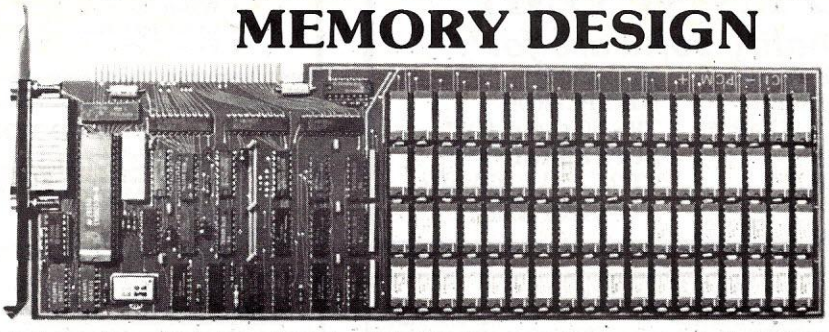
Listing 3.

```
100  REM  FOUR COLORFUL CIRCLES
110  DIM AX(51),AY(51)
120  HGR : HCOLOR= 3:C = 0
130 DIAM = 80:XP = 65:YP = 50
140 PI = 3.14159:INC = PI / 50
150  FOR J = 0 TO PI STEP INC
160 C = C + 1
170 R = DIAM *  SIN (J) + 0.5
180 AX(C) = R *  SIN (J) + XP
190 AY(C) = R *  COS (J) + YP
200  HPLOT AX(C),AY(C)
210  NEXT J:W = 0
220  REM  FILL IN CIRCLE
230  FOR J = 1 TO 50
240  FOR C = 1 TO 50
250  HPLOT AX(C),AY(C) TO AX(J),A
     Y(J)
260  HPLOT 279 - AX(C),AY(C) TO 2
     79 - AX(J),AY(J)
270  HPLOT 279 - AX(C),159 - AY(C
     ) TO 279 - AX(J),159 - AY(J)
280  HPLOT AX(C),159 - AY(C) TO A
     X(J),159 - AY(J)
290  NEXT C
300 W = W + 1: IF W > 2 THEN W =
     1
305  HCOLOR= W
310  NEXT J
```

CIRCLE 130 ON READER SERVICE CARD

CHRISLIN YEARS AHEAD IN MEMORY DESIGN

COMING SOON! 1 MB DUAL BOARD MEMORY!

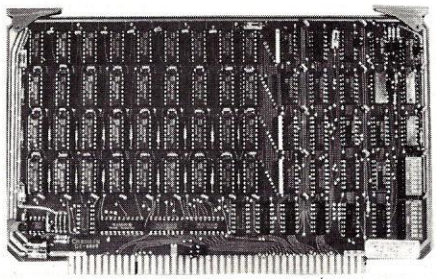


512KB SINGLE BOARD IBM MEMORY W/RS232-C PORT

- Addressable as a contiguous block in 64KB increments thru 1 megabyte.
- On board parity with interrupt on parity error.

SINGLE QTY. PRICE: $895.00 **MEMDISK 1: $10.00**

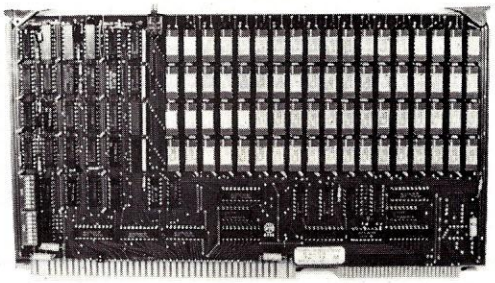
MEMDISK 1 Allows memory to emulate disks. Increases system performance!!



64KB SINGLE BOARD EXORCISOR 1, 11, AND ROCKWELL SYSTEMS 65 MEMORY

- Parity checker on board.
- Addressable as a contiguous block in 4K increments with respect to VXA or VUA.
- Pin to Pin compatibility.

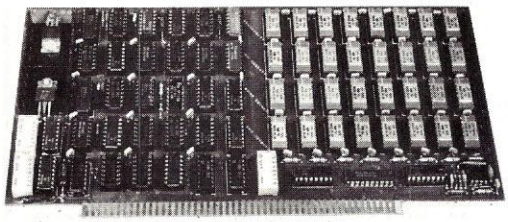
SINGLE QTY. PRICE: $390.00



512KB SINGLE BOARD MULTIBUS MEMORY

- Pin to Pin MULTIBUS compatibility for both 8 bit and 16 bit systems.
- On board parity with selectable interrupt on parity ERROR.
- Addressable as a contiguous block in 16K word increments up to 16 megabytes.

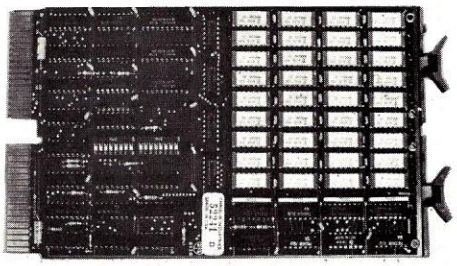
SINGLE QTY. PRICE: $1395.00



64KB SINGLE BOARD S100 MEMORY

- Addressable as a contiguous block in 4K word increments.
- Battery back-up capability.
- Functions with on-board refresh.

SINGLE QTY. PRICE: $390.00



256KB SINGLE BOARD LSI 11 MEMORY

- On board parity generator checker.
- Addressable as a contiguous block in 4K word increments through 4 megabytes.
- Battery back-up mode.

SINGLE QTY. PRICE: 128K x 18 $795.00
32K x 18 $390.00

DON'T ASK WHY WE CHARGE SO LITTLE, ASK WHY THEY CHARGE SO MUCH.

Chrislin Industries, Inc.

31352 Via Colinas • Westlake Village, CA 91362 • 213-991-2254
TWX 910-494-1253 (CHRISLIN WKVG)

Multibus is a trademark of the Intal Corp. LSI II is a trademark of Digital Equipment Corp. EXORciser is a trademark of Motorola.

CIRCLE 131 ON READER SERVICE CARD

DYNACOMP

Quality software for:*

APPLE II Plus	ALTAIR****
OSBORNE-1	NEC PC-8000
NORTH STAR***	TRS-80 (Level II)**
ATARI	SUPERBRAIN*****
PET/CBM	CP/M Disks/Diskettes

(See Availability box MBASIC/CBASIC)

CARD GAMES

NEW

BRIDGE MASTER (Available for all computers) Price: $21.95 Diskette

If you liked DYNACOMP'S BRIDGE 2.0, you will absolutely love BRIDGE MASTER. BRIDGE MASTER is a comprehensive bridge program designed to provide hours of challenging competition. Bidding features include the Blackwood convention, Stayman convention, pre-emptive openings, and recognition of demand bids and jump-shift responses. After playing a specific hand, you may replay the same hand, with the option of switching cards with your computer opponents. This feature allows you to compare your bidding and playing skills to BRIDGE MASTER. Bonuses for game contracts and slams are awarded as in duplicate bridge. Doubled contracts are scored based upon a computer assigned vulnerability. A score card is displayed at the conclusion of each hand. The score card displays a summary of total hands played, total points scored, number of contracts made and set, and % bids made. BRIDGE MASTER is clearly the best computer bridge program available.
DYNACOMP'S previous BRIDGE 2.0 customers may upgrade to BRIDGEMASTER for a nominal charge of $5.00 plus postage and handling (see ordering information box). Original cassette/diskette must be returned.

BACCARAT (Atari only) Price: $18.95 Cassette/$22.95 Diskette

This is the European card game which is the favorite of the Monte Carlo jet set. Imagine yourself at the gaming table with 007 to your left and Goldfinger to your right. Learn and play BACCARAT at your leisure on the Atari. Contains full high resolution color graphics and matching sound. Runs in 16K. Requires one joystick.

GIN RUMMY (Apple diskette only) Price: $22.95 Diskette

This is the best micro computer implementation of GIN RUMMY existing. The computer plays exceptionally well, and the HIRES graphics are superb. What else can be said?

POKER PARTY (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple cassette and diskette versions require a 32K (or larger) Apple II.

GO FISH (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette

GO FISH is a classic children's card game. The opponent is a friendly computer with user inputs that are simple enough for small children to easily master. The Apple and Atari versions employ high resolution graphics for the display of hands. A must for children! Runs in 16K.

NEW

BLACKJACK COACH (32K TRS-80 only) Price: $29.95 Cassette/$33.95 Diskette

BLACKJACK COACH teaches and evaluates professional playing methods. This program will coach you using the Basic and the Complete Card Counting Methods. The BLACKJACK COACH can be used in automatic, unattended play to test the playing and betting strategies you select. Extensive summary reports pinpoint the strengths and weaknesses of various methods of play. All the standard player choices are included: Insurance, splitting pairs, double downs and surrender (optional). A line printer may be used to collect data. If you risk money at the tables, increase your skills with the BLACKJACK COACH!

THOUGHT PROVOKERS

MANAGEMENT SIMULATOR (Available for all computers) Price: $25.95 Cassette/$29.95 Diskette

This program is both an excellent teaching tool as well as a stimulating intellectual game. Based upon similar games played at graduate business schools, each player or team controls a company which manufacturers three products. Each player attempts to outperform his competitors by setting selling prices, production volumes, marketing and design expenditures etc. The most successful firm is the one with the highest stock price when the simulation ends.

FLIGHT SIMULATOR (Available for all computers) Price: $19.95/Cassette/$23.95 Diskette

A realistic and extensive mathematical simulation of take-off, flight and landing. The program utilizes aerodynamic equations and the characteristics of a real airfoil. You can practice instrument approaches and navigation using radials and compass headings. The more advanced flyer can also perform loops, hall-rolls and similar aerobatic maneuvers. Although this program does not employ graphics, it is exciting and very addictive. See the software review in COMPUTRONICS. Runs in 16K Atari.

VALDEZ (Available for all computers) Price: $17.95 Cassette/$21.95 Diskette

VALDEZ is a computer simulation of supertanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modelled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software reviews in 80 Software Critique, Personal Computing and Creative Computing.

BACKGAMMON 2.0 (Available for all computers) Price: $19.95 Cassette/$23.95 Diskette

This program tests your backgammon skills and will also improve your game. A human can compete against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.

NEW

FROG MASTER (Atari only) Price: $17.95 Cassette/$21.95 Diskette

The Atari APEX first prize winner. FROG MASTER contains exciting arcade features in addition to being a highly educational program. It is a fast-moving high-concentration game for 1-4 players. You score by making touchdowns on the opponents' goal line – if his goalie doesn't get there first. But your players (tadpoles and frogs) must be trained. This is accomplished by giving them a reward at just the right moment when they do something right. This takes precise timing and judgement. Your critters must penetrate barriers and avoid evil line backs if they are to score. Many will fall by the wayside, but some will get through. As they learn you can look inside their heads to see how they think. As you reward them, they reward you (the "thought processes" simulated demonstrate the basic type of animal learning - operant conditioning - widely studied in high school and college courses). As you teach them they teach you how learning takes place! Great graphics! Runs in 16K. Requires two joysticks.

FOREST FIRE! (Atari only) Price: $14.95 Cassette/$18.95 Diskette

Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalities. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.

CRANSTON MANOR ADVENTURE (North Star, SuperBrain and CP/M only) Price: $19.95 Diskette

At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette.

SPACE EVACUATION! (Available for all computers) Price: $15.95 Cassette/$19.95 Diskette

Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE.

MONARCH (Atari only) Price: $14.95 Cassette/$18.95 Diskette

MONARCH is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. Runs in 16K Atari.

NEW

RUBIK'S CUBE SOLVER (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette/$21.45 Disk

Solving the Rubik's cube puzzle is an exercise in algorithimic logic, and is a "natural" for computer calculation. The RUBIK'S CUBE SOLVER permits you to input the starting state of the 24 facing elements of the cube. It then solves the problem one step at a time, with each step shown as a unfolded view of the cube. Can you solve the cube in fewer steps. In any case, it sure beats disassembling the cube or peeling off and replacing the colors! Requires 16K.

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II), NEC and Apple (Applesoft) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible format) 8" CP/M floppy disks for systems running under MBASIC or CBASIC (for example, Altos, Xerox 820, Heath/Zenith and many others). 5¼" CP/M diskettes are available for the North Star, SuperBrain and Osborne computer systems.

**ATARI, PET/CBM, NORTH STAR, CP/M, IBM, OSBORNE, SUPERBRAIN, NEC PC-8000 and XEROX are registered tradenames and/or trademarks.*
***Except where noted, all TRS-80 Model I software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER, TRS-80 diskettes are not supplied with either DOS or BASIC.*
****For most North Star disk-based systems.*
*****For Altair systems having Microsoft BASIC.*
******For SUBERBRAIN systems running under MBASIC or CBASIC (state which).*

DYNACOMP OFFERS THE FOLLOWING

- Widest variety
- Guaranteed quality
- Fastest delivery
- Friendly service
- Free catalog*
- Toll free order phone

*$2.00 U.S. funds for foreign mailing.

AND MORE...

NEW

STARBASE 3.2 (Available for all computers) Price: $13.95 Cassette/$17.95 Diskette

This is the classic space simulation, but with several new features. For example, the Croylins now shoot at the invincible without warning while also attacking starbases in other quadrants. The Croylins also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Invincible is besieged by three heavy cruisers and a starbase S.O.S. is received! The Croylins get even! See the software reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.

LIL' MEN FROM MARS (Atari only) Price: $19.95 Cassette/$23.95 Diskette

Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.

ALVIN (Atari only) Price: $17.95 Cassette/$21.95 Diskette

ALVIN is a great arcade game. You are commanding a highly maneuverable ship seeking to destroy several enemy cities. You are attempting to bomb these cities while at the same time trying to avoid their defensive fire (MISSILE COMMAND™ in reverse?). Also, your radar has been damaged so that you can only see downwards. This would normally not be much of a problem except that you also have to contend with high-flying enemy aircraft. As long as you are above these aircraft you have the advantage and are safe. However, high level bombing takes considerable skill. Therefore to achieve your goal the best strategy is to swoop down for a bombing run while the enemy craft is out of range, and quickly retreat to the skies. A fun game. Requires 16K.

ESCAPE FROM VOLANTIUM (Atari only) Price: $15.95 Cassette/$19.95 Diskette

Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTIUM! To escape you must maneuver your space ship around obstacles and laser blast the guardian (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new guardian appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and guardians appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.

ALPHA FIGHTER (Atari only) Price: $13.95 Cassette/$17.95 Diskette

Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.

THE RINGS OF THE EMPIRE (Atari only) Price: $14.95 Cassette/$18.95 Diskette

The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.

INTRUDER ALERT (Atari only) Price: $15.95 Cassette/$19.95 Diskette

This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.

MIDWAY (Atari 32K only) Price: $14.95 Cassette/$18.95 Diskette

MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.

NEW

GOLF PRO (Atari only) Price: $17.95 Cassette/$21.95 Diskette

Both realism and beautiful graphics are joined together in GOLF PRO to produce the best golf simulation available. To really appreciate this game, you should have a color TV so that you can see the green of the fairway, the blue of the water hazards, and the white sand of the traps. You tee off with a wood, use your wedge in the sand trap, and putt on the green just as would be done on the course. Show off the Atari to your friends with GOLF PRO. Requires 16K and one joystick.

GAMES PACK I (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette

GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSERACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.

GAMES PACK II (Available for all computers) Price: $14.95 Cassette/$18.95 Diskette

GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.
Why pay $9.95 or more per program when you can buy a DYNACOMP collection for just $14.95?

MOON PROBE (Available for all computers) Price: $12.95 Cassette/$16.95 Diskette

This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. Runs in 16K Atari.

SPACE TRAP (Atari only, 16K) Price: $14.95 Cassette/$18.95 Diskette

This galactic "shoot 'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.

SUPER SUB CHASE (Atari only) Price: $19.95 Cassette/$23.95 Diskette

SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.

TWO PLAYER GAMES

NEW

TWO PLAYER GAMES (Available for all computers; 32K disk/diskette only)

DYNACOMP has acquired the distribution rights to the best eight of Xitron's war games. These two-player games were originally written for the North Star computer, but have since been converted to play on all of the computers currently supported by DYNACOMP. Because our licensing and development costs were so low, DYNACOMP offers these programs two to a disk(ette) for only $19.95/diskette, $23.95/disk. If you like war games, then this is a bargain you can not pass up.

Set #1: PANZER and BLITZKRIEG

PANZER
Date: 23 Nov. 1943 Place: Several miles west of Kiev, Russia. The Russians have just liberated Kiev and are moving quickly to reach the German forces which are preparing for a last desperate attempt to halt the Russian advance.

BLITZKRIEG
Date: Spring 1940 Place: Northern France. The German blitzkrieg in the east was complete. Germany had turned its attention to the west: France. The German forces has penetrated the Ardennes and Meuse. The heroism of Dunkirk, the defense of the Aisne-Somme position, and the final collapse of the French armies in the south has all passed. And, now, the drive on Paris . . .

Set #2: STARSHIP TROOPERS and INVASION OF THE MUD PEOPLE

STARSHIP TROOPERS
Date: Fortieth Century Place: Arachnid planet of Sheol. The first all-out battle on the planet Sheol which will match equal forces of Terran and alien units. The outcome will set the course of the conflict, for the planet of Sheol is a key position in the solar war.

INVASION OF THE MUD PEOPLE
A Peruvian army battalion has been dispatched to a remote village area to investigate the destruction of many local dwellings and the disappearance of most of the villagers. Eye-witnesses have reported strange creatures appearing from scores of slimy mud holes which have oddly begun forming across the terrain.

Set #3: FALL OF THE THIRD REICH and ARMORCAR

FALL OF THE THIRD REICH
Date: March, 1945 Place: Remagen, Germany. The allies under General Eisenhower had reached the Rhine. The Germans had failed in destroying the Ludendorff railroad bridge, allowing several allied divisions to cross before it finally collapsed on March 17 ... and so, the allies began their drive on Berlin.

ARMORCAR
Date: 2 Feb. 1944 Place: Minsk, Russia. A German front-line unit is hard pressed for radio equipment and medical supplies. A relief convoy of armored cars must reach them through partisan-infested territory.

Set #4: MOUNT SURIBACHI and MIDDLE EARTH

MOUNT SURIBACHI
Date: 16 Feb. 1945 Place: Iwo Jima. The Japanese opened fire from Mount Suribachi as the marines landed on the porkchop-shaped island. Gunfire from the hill could cover the entire island, thus it was a critical objective if the Americans were to capture and utilize the all-important air field. Mount Suribachi proved to be one of the most strongly defended positions in the Japanese theatre of war.

MIDDLE EARTH
Date: 1997 Place: MIDDLE EARTH. Through a maze of tunnels, crevices, and rocky passageways discovered leading from an inactive volcano in South America, a team of United Nations' researchers have undertaken a mission to an uncharted frontier: the center of the Earth. After a perilous journey spanning a period of several months, the mission has arrived at the Earth's core, a land of flames, steam, oceans, and unforeseen vegetation. And then the creatures of MIDDLE EARTH appeared . . . unmatched by the most frightening horror stories created by man . . .

MISCELLANEOUS

CRYSTALS (Atari only) Price: $14.95 Cassette/$18.95 Diskette

A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari. Runs in 16K.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY

DYNACOMP now distributes the 23 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.
Price: $9.95 each/$8.95 each (4 or more)
The complete collection may be purchased for $159.95.

NEW

5¼" DISKETTES (soft sectored/ten sectored) Price: $39.95/20 Diskettes

As you might imagine, DYNACOMP purchases diskettes in large quantities and at wholesale prices. We want to pass the savings along to you!

BUSINESS and UTILITIES

NEW

PORTFOLIO MANAGEMENT (Apple only) — Price: $69.95 two Diskettes

The PORTFOLIO MANAGEMENT package was written by a stock broker to help manage portfolios for individual customers. With this program data files can be easily created and kept up to date. A variety of reports can be generated for clients which are attractively and professionally laid out. The user may define his/her own investment catagories. PORTFOLIO MANAGEMENT is a top quality, professional tool which will not only provide you with new conveniences but will also serve to enhance your appearance as an efficient and up to date advisor to your clients. Comes complete on two diskettes along with a 30 page instruction manual.

NEW

PERSONAL FINANCE SYSTEM (Available for all computers) — Price: $39.95 Diskette

PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and tax deductible items, PFS will sort and summarize expenses by payee, and display information on expenditures by any of 26 user defined codes by month or by payee. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (24K Atari, 32K North Star) and will store up to 600 records per disk (and over 1000 records per disk by making a few simple changes to the programs). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate guesswork and tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

FAMILY BUDGET (Apple and Atari only) — Price: $34.95 Diskette

FAMILY BUDGET is a very convenient financial record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and charitable donations. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to 5 payroll and tax accounts. Data are easily retrieved giving the user complete control over an otherwise complicated (and unorganized!) subject.

NEW

TEXT MASTER (Apple 32K, diskette only) — Price: $49.95 Diskette

TEXT MASTER is a general purpose text editor for the Apple II computer. It features powerful, English-oriented commands which permit the complete manipulation of textural information. The information treated may be correspondence, computer programs, data to be used by other programs, and more. TEXT MASTER also interfaces with any printer connected to your Apple. The minimum system requirements are 32K of RAM, Applesoft on ROM, at least one disk, and a lower case adapter. TEXT MASTER can process any length file segment by segment. Thus it is possible to process files as large as a diskette. Comes complete with an efficient 16 page manual. TEXT MASTER is equivalent in capability to many word processing systems costing 3 x or more in price. The commands available in TEXT MASTER are: COLLECT, USE, EXECUTE, NONUM, INSERT, MERGE, STOP, RENUM, DELETE, SAVE, COPY, FREE, REPLACE, WAIT, MOVE, LENGTH, LIST, RESAVE, CLEAR, AUTO, RETRY, APPEND, SET, MANUAL, CHANGE, SCRATCH, SHOW, CATALOG, MODIFY, COMPARE, NUM, DISPLAY, HELP.

INTELINK (Atari only) — Price: $49.95 Diskette

This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., The SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the complete contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the support text editor and later "uploaded" to another computer, making the Atari a very smart terminal. Even Atari BASIC programs may be uploaded. Further, a command file may be built off-line and used later as controlling input for a time-share system. That is, you can set up your sequence of time-share commands and programs, and the Atari will transmit them as needed; batch processing. All this adds up to saving both connect time and your time.

NEW

PAYFIVE (Apple II plus diskette, two drives required) — Price: $149.95

This is an enormously flexible employee payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and compiles the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes many other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for $30, and that payment later applied to the software purchase.

SHOPPING LIST (Atari only) — Price: $12.95 Cassette/$16.95 Diskette

SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

NEW

TAX OPTIMIZER (Available for all computers) — Price: $59.95 Diskette

The TAX OPTIMIZER is an easy-to-use, menu-oriented software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files. TAX OPTIMIZER is tax deductible!

STOCK MASTER/STOCK PLOT (Apple 48K) — Price: $59.95 Diskette

This is a full-featured stock portfolio management and analysis system. Ten years of records on up to thirty stocks may be maintained. You may record prices, revenue, earnings/share, ROE, quarterly earnings and dividends, transactions, long/short term gains, P/E, indexes (DJ, S & P, NASDAQ) and MORE! You may plot (HIRES) the price history of any stock against any other, time, or the indexes. Portfolio value may be evaluated at any time. Comes complete with superbly written instructions and sample files on a second diskette.

TURNKEY AND MENU (Atari only) — Price: $17.95 Diskette

TURNKEY is a utility program which allows you to create autoboot/autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU. MENU lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

STOCKAID (Atari only) — Price: $29.95 Diskette

STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 239 days x 16 stocks. Included are stock dividend and split adjustment capabilities. A very professional package!

NEW

NYINDEX (Atari only) — Price: $29.95 Diskette

NYINDEX is a comprehensive software package for storing, retrieving and plotting New York Stock Exchange information. The daily data treated includes the composite index, advances, declines, new highs and new lows. Graphical displays include the above plus the index oscillator, cumulative advances/declines and moving averages. Data entry and editing is easy. The diskette includes more than two years of daily data. NYINDEX is an excellent companion to STOCKAID.

PLAYER-MISSILE GRAPHICS TABLET (Atari only) — Price: $19.95 Diskette

The PLAYER-MISSILE GRAPHICS TABLET was designed to take the drudgery out of developing four color displays in GRAPHICS MODE 7. No longer will you have to read the locations of those tiny blocks on your graph paper and calculate PLOTs and DRAWTOs. With PMG you will be able to easily design colorful graphic displays with your joystick and save them on diskette for later recall.

LIFE CYCLE ANALYSIS AND DEPRECIATION (Apple diskette only) — Price: $39.95 Diskette

This software package creates a data file of business expenses for equipment which can later be used to calculate and display a variety of reports. You may project annual costs, find the present worth, create depreciation schedules and justify tax deductions. The evaluation techniques conform to standards set by federal agencies. This is an invaluable package for any businessman who has invested in equipment. LIFE CYCLE ANALYSIS features an easy to use data file creation section and provides formatted hardcopy reports for use in presentations or for tax record keeping purposes. When used for generating tax information, this package is tax deductible! Requires 48K. Comes on two diskettes.

NEW

MICROMAGIC (Apple diskette only) — Price: $39.95 Diskette

The emphasis of this program is clearly the MAGIC! MICROMAGIC offers outstanding versatility in its ability to function as a stand alone entertainment package or as a utility program to create stunning *animated* graphics for use in other programs. The secret lies in MICROMAGIC's special on screen graphics editor. You control a graphics cursor directly from the keyboard, creating high resolution images using all 16 available colors. When you are done with a picture, it can be saved on disk with a single key command. Up to 24 images can be saved as "frames" of a movie, and then played back at high speed to creat short animated sequences. The effects are truly stunning.

This package comes complete with demonstration programs so that even novice users can get immediate results. No programming skills are necessary to use MICROMAGIC. If you have been frustrated by the effort required to create graphics images with your computer, MICROMAGIC will delight you.

SHAPE MAGICIAN (Apple II, 48K, diskette only) — Price: $29.95

At last! An utility for painlessly creating graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or Master Card, include all numbers on card. Purchase orders accepted.

Shipping and Handling Charges
Within North America: Add $2.00
Outside North America: Add 15% (Air Mail)

Delivery
All orders (excluding books) are sent First Class.

Quantity Discounts
Deduct 10% when ordering 3 or more programs; 20% when ordering 5 or more. Dealer discount schedules available upon request.

8" CP/M Disks
Add $2.50 to the listed diskette price for each 8" floppy disk (IBM soft sectored CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5¼" CP/M Disks
All software available on 8" CP/M disks is also available on 5¼" disks, North Star, Osborne, Superbrain and NEC format.

Ask for DYNACOMP programs at your local software dealer. Write for detailed descriptions of these and other programs from DYNACOMP.

DYNACOMP, Inc. (Dept. C)
1427 Monroe Avenue
Rochester, New York 14618
24 hour message and order phone: (716) 442-8731
Toll free order phones: (800) 828-6772
(800) 828-6773
Office phone (9AM-5PM EST): (716) 442-8960

New York State residents please add 7% NYS sales tax.

EDUCATION

HODGE PODGE (Apple 48K only) — Price: $14.95 Cassette/$18.95 Diskette

Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1½ to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORLD and SOFTALK.

TEACHER'S AIDE (Atari and PET only) — Price: $13.95 Cassette/$17.95 Diskette

TEACHER'S AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiplication problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems; one particularly nice feature of the division module is that the long hand division steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers) — Price: $39.95 Cassette/$43.95 Diskette

DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

DATA SMOOTHER (Not available for Atari) — Price: $19.95 Cassette/$23.95 Diskette

This special data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculation. Also included is automatic plotting of the input data and smoothed results.

FOURIER ANALYZER (Available for all computers) — Price: $19.95 Cassette/$23.95 Diskette

Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFA (Transfer Function Analyzer) — Price: $19.95/$23.95 Diskette

This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers) — Price: $24.95 Cassette/$28.95 Diskette

HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of $51.95 (three cassettes) and $63.95 (three diskettes).

REGRESSION I (Available for all computers) — Price: $19.95 Cassette/$23.95 Diskette

REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option; an extensive internal library of fitting functions; data editing; automatic data, curve and residual plotting; a statistical analysis (e.g.: standard deviation, correlation, coefficient, etc.) and much more. In addition, new fits may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

REGRESSION II (Available for all computers) — Price: $19.95 Cassette/$23.95 Diskette

PARAFIT is designed to handle those cases in which the parameters a imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A(1), A(2), etc.) as one or more BASIC statement lines. Data, results and residuals may be manipulated and plotted as with REGRESSION I. Use REGRESSION I for polynomial fitting, and PARAFIT for those complicated functions.

MULTILINEAR REGRESSION (MLR) (Available for all computers) — Price: $24.95 Cassette/$28.95 Diskette

MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for $51.95 (three cassettes) or $63.95 (three diskettes).

ANOVA (Not available on Atari cassette or for PET/CBM) — Price: $39.95 Cassette/$43.95 Diskette

In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2^{K-P} factorial designs. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion (by a professor in the subject) and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 (Not available for Atari)

DYNACOMP is the exclusive distributor for the software keyed to the popular texts *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Volume 1
Collection #1: Chapters 2 and 3 - Data and function plotting; complex variables and functions.
Collection #2: Chapter 4 - Extended matrix and vector operations.
Collection #3: Chapters 5 and 6 - Random number generators (Poisson, Gaussian, etc.); series approximations.
Price per collection: $16.95 Cassette/$20.95 Diskette
All three collections are available for $44.95 (three cassettes) and $53.95 (three diskettes).

Volume 2
Collection #1: Chapter 1 - Linear, polynomial, multidimensional, parametric least squares.
Collection #2: Chapter 2 - Series approximation techniques (economization, inversion, reversion, shifting, etc.)
Collection #3: Chapter 3 - Functional approximations by iteration and recursion.
Collection #4: Chapter 4 - CORDIC approximations to trigonometric, hyperbolic, exponential and logarithmic functions.
Collection #5: Chapter 5 - Table interpolation, differentiation and integration (Newton, LaGrange, splines).
Collection #6: Chapter 6 - Methods for finding the real roots of functions.
Collection #7: Chapter 7 - Methods for finding the complex roots of functions.
Collection #8: Chapter 8 - Optimization by steepest descent.
Price per collection: $14.95 Cassette/$18.95 Diskette

All eight collections are available for $99.95 (eight cassettes) and $129.95 (eight diskettes).
Because the texts are a vital part of the documentation, *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* are available from DYNACOMP:
BASIC SCIENTIFIC SUBROUTINES, Vol. 1 (319 pages): $19.95 + 75¢ postage
BASIC SCIENTIFIC SUBROUTINES, Vol. 2 (790 pages): $23.95 + $1.50 postage
See reviews in KILOBAUD, Dr. Dobbs, and ACCESS.

NEW

SOFTNET (Apple II and TRS-80 48K diskette only) — Price: $129.95

SOFTNET may be used to create models of liquid pipeline systems to evaluate their flow performance. Up to 150 nodes with up to 150 connecting elements may be simulated, and models may be combined to form yet larger models. If you are involved in water distribution systems, chemical fluid flow problems, building plumbing, or similar situations, this is an ideal analysis tool.

NEW

FILTER ANALYSIS (Apple only) — Price: $19.95 Cassette/$23.95 Diskette

FILTER ANALYSIS is the ideal program for determining the frequency response of passive filters. Any number of RLC components may be included, and any number of poles treated. FILTER ANALYSIS features its own mini-language which makes circuit description simple. Results may be printed in tabular form or plotted in HIRES graphics (decibels versus log-frequency).

ACTIVE CIRCUIT ANALYSIS (Available for all computers) — Price: $35.95 Cassette/$39.95 Diskette

With ACAP you may analyze the response of an active or passive component circuit. The circuit may be probed at equal steps in frequency, and the resulting complex voltages at each component juncture examined; the frequency response of a filter or amplifier may be completely determined with respect to both amplitude and phase. In addition, ACAP prints a statistical analysis of the range of voltage responses which result from tolerance variations in the components. ACAP is easy to learn and use. Circuit descriptions may be saved onto cassette or diskette to be recalled at a later time for execution or editing. ACAP should be part of every circuit designer's program library. Requires 48K.

LOGIC SIMULATOR (Available for all computers) — Price: $35.95 Cassette/$39.95 Diskette

Test your complicated digital logic design with respect to given set of inputs to determine how well the circuit will operate. The elements which may be simulated include multiple input AND, OR, NOR, EXOR, EXNOR and NAND gates, as well as inverters. J-K and D flip-flops, and one-shots. Inputs may be clocked in with varying clock cycle lengths/displacements and delays may be introduced to probe for glitches and race conditions. A timing diagram for any given set of nodes may be plotted. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR. Requires 48K.

NEW

BEAM DEFLECTION (Available for all computers) (disk/diskette only) — Price: $29.95 Diskette/$32.45 Disk

BEAM DEFLECTION is the first in DYNACOMP's new series of structural analysis software packages. It consists of two programs. The first program permits the development of data files which describe the problem. For example, the ends of the beam may be pinned, clamped or free. The beam may be uniformly supported by an elastic bed, or held up by springs variously placed and having differing spring constants. The elasticity and cross section of the beam may vary along its length. The load may be uniformly distributed or it may include discrete forces. The beam may be pinned at various points along its length. And so on. All this information may be easily entered and edited using the data input program.

Following this the analysis program is called. The calculated results are the stress and deflections of the beam, both in numerical and graphical form, since the input data is saved, cases may be easily re-run with modification, thereby permitting iterative design.

The documentation which comes with BEAM DEFLECTION clearly shows how to use the software. In addition, three text problems are described and demonstrated to ensure that you understand how to use the program. Also, helpful theoretical information is supplied in the appendix.

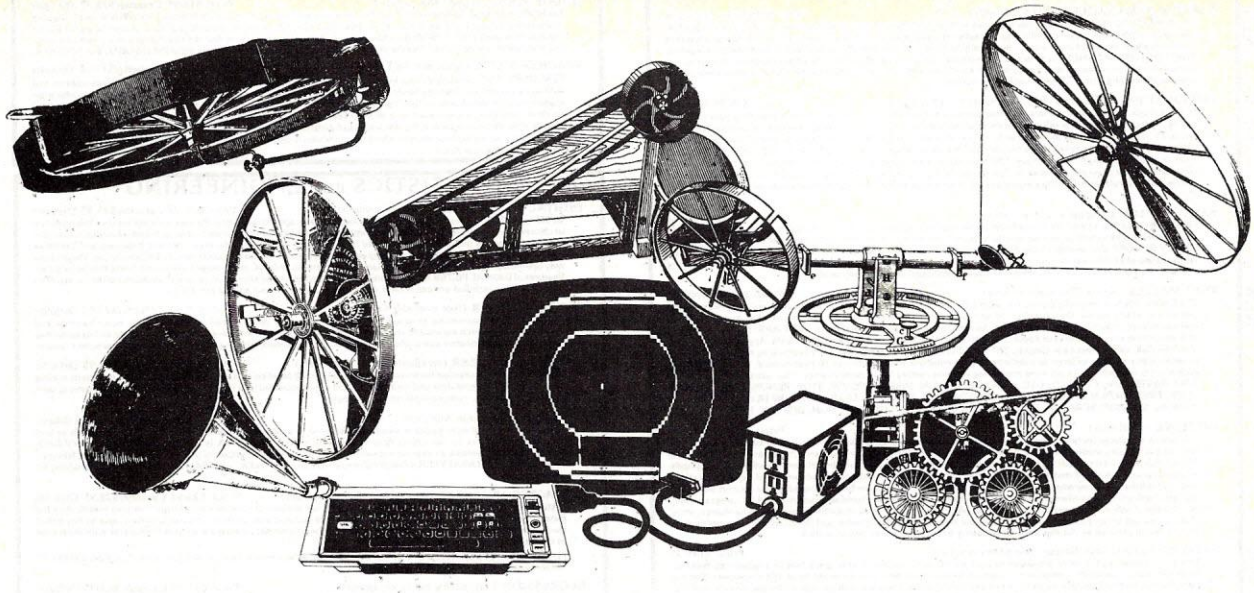
STATTEST (Not available on Atari cassette or for PET/CBM) — Price: $19.95 Cassette/$23.95 Diskette

This is a statistical inference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear correlation and regression. This menu-directed statistical workhorse is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

CIRCLE 166 ON READER SERVICE CARD



Programming Wheels

Robert D. Hastings

Anyone who writes computer programs will get the feeling sooner or later that he is reinventing the wheel when developing code to perform common functions.

The purpose of this article is to help you avoid the need to reinvent some common programming wheels. The wheels provided here are subroutines developed as part of an overall Medical Office system that I have written.

They include a method of printing standardized error messages, an input checking routine, a number checker, a date checker, and a way to manipulate time (now doesn't that sound intriguing).

The individual subroutines may be used singly or nested together in a program.

The system used to develop these routines is an IBM Personal Computer with 64K memory, one 5 1/4" floppy disk drive, a color graphics display board, a parallel printer interface with a C. Itoh Model 1540 printer, and an El Cheapo 13" black and white TV set. The system runs with IBM DOS and Advanced Disk BASIC. Wherever I have used an unusual IBM Basic statement, an explanation of its function is included.

Error Messages

Let's start with the subroutine that is the most important part of any program that is operated by the uninitiated (that is anyone who doesn't eat, drink, and sleep with a computer as you and I do). This is the routine which prints a customized error message on the bottom of the display in response to incorrect operator input or a program failure condition. *Big deal*, you might say. So did I until I tried to create the routine and made 483 stupid mistakes. I did verify Programmer's Hypothesis #27 which states that programming errors increase exponentially with the lateness of the hour.

Robert D. Hastings, 1122 South Brook Street, Louisville, KY 40203.

Listing 1 is the error printing subroutine. The information that must be prepared prior to calling the subroutine is the actual error message stored in ERR MSG$ (clever variable name, huh?) and the position of the cursor prior to entering the subroutine stored in ROW and COL. In IBM Basic, this is acquired as follows:

```
100 ROW = CSRLIN : COL = POS(0)
```

The subroutine performs several functions. It sets an error flag to indicate that an error has been printed, beeps to wake you up, prints the error message in reverse video on the bottom of the screen, and, if called in response to an incorrect input by the operator, erases the incorrect input and returns the cursor to the original location.

IBM Basic has several interesting features which are used here. The normal video size is 24 x 40 or 24 x 80. This is software controlled by the WIDTH X command. The 25th line is normally used to display the mnemonics associated with the ten function keys located on the left side of the keyboard. However, the 25th line may be used by a program if the mnemonics are turned off. Line 970 does this.

If this line were located at the beginning of the main program, it would not have to be repeated here. A unique feature of this magic 25th line is both a blessing and a curse. This is the fact that the 25th line does *not* scroll upward with the rest of the screen when information is displayed —what a perfect place to anchor an error message.

Now for the secret curse. Even though the 25th line does not scroll, if the contents to be printed on the line exceed the display width, the remainder of the line is printed on the 24th line and does scroll upward. Stay tuned for an explanation of how this was cleverly deduced. But first, back to the listing.

Line 990 is not a gag. The BEEP statement toggles an 800 MHz. tone through the PC speaker for a quarter of a second. PRINT CHR$(7) serves the same function. The LOCATE command in line 1000 moves the cursor to row 25, column 1 and turns off the cursor. Line 1010 invokes reverse video (black on white) and line 1020 prints the error message.

Now back to the curse. The STRING$(X,Y) function returns a string of length X whose characters all have ASCII code Y. POS(0) returns the present cursor column position which, in this application, would appear right at the end of the error message.

What I wanted to do was to print white blanks to the end of the line so that the entire line would be in reverse video, regardless of the length of the message. That's what I wanted to do. However,

on the 24th line which then merrily moves upward on the screen as you print other information.

If the previous dissertation made no sense at all, just remember to keep error messages shorter than the display width. To insure that this would not happen to me again, I defined the variable WIDE= 40 in the main program to be the value of the display width.

Then I changed line 1020 to truncate the error message to the length set by WIDE. The LEFT$(X$,Y) function does this by creating a substring of X$ that starts at the leftmost character and extends for a length of Y characters.

The next two lines, 1030 and 1040, return the video to normal and the cursor to the position it occupied prior to printing the error message. But before we leave this fancy routine, let's do one more thing.

Good programming practice demands that the program print a prompt prior to each operator input and then check the input for correctness. If an error is detected, the program should print an error message and prompt the operator for another input.

since the Medical System would use an 80-character monitor, I thought I would save myself a few keystrokes later on by extending the STRING$ function to the end of an 80-character line with STRING $(80,32).

What I had missed was a piece of information on page 4-186 of the IBM Basic manual which states that "If the printed line is longer than the defined WIDTH, Basic goes to the next physical line and continues printing." My El Cheapo TV displays a 40-character line.

As I mentioned before, when you try to print an 80-character string on the non-scrolling 25th line of a 40-character display, the remainder of the line is printed

Remember that ROW and COL contain the location of the cursor prior to the printing of the error. Line 1050 prints a string of blanks to erase the incorrect input and line 1060 returns the cursor to its original position.

All of this may seem to be a great deal of trouble just to print an error message, but there are important programming principles at work here. All error messages should be easy to read, easy to understand, and should attract the operator's attention immediately. This routine accomplishes two of the three objectives. Clear and simple error message text will accomplish the third.

Checking Input

A second subroutine (Listing 2) developed in the total Medical Office system provides a method of checking an operator input to see if it is a number. The operator input is placed in the variable, CHECK$. The subroutine first sets the error flag, MISTAKE, to zero and prints a line of blanks on the 25th line.

The variable BLANK$ has been defined in the main program as a 40-character string of blanks. Remember that the 25th line is where error messages are printed by the error printing routine.

The number checking subroutine then looks at each character individually with the MID$(X$,Y,Z) function. X$ is the string to be divided, Y is the starting position, and Z is the number of characters in the substring.

Line 880 checks to see if the ASCII value of the substring lies between 48 and 57—the digits 0 through 9. If the entire input is numeric, the subroutine returns to the main program. If a non-numeric character is found, line 890 checks to see if it is a decimal point. If is not a decimal point, then ERRMSG$ is loaded with the proper error message and the error printing subroutine is called.

Since the error printing routine changes the value of MISTAKE from zero to one, it is an easy matter for the main program to detect an error by checking the value of MISTAKE.

Editing Input

Many business programs make use of multiple menus to guide operator input. They also allow the operator to return to the main menu or to the beginning of the program by pressing the ESC key. The next subroutine (Listing 3) provides this capability, as well as some input editing features.

After initializing the INPT$ variable, the routine turns on a medium sized cursor with the LOCATE,,1,6,7 command. The 1 means turn on, and the 6,7 specifies the cursor size and position.

Lines 100 and 110 wait for an operator keystroke. Each keystroke undergoes four tests. ASCII value 27 in line 120 is the value for the ESC key, which returns the subroutine to line number 1640 at the beginning of the main program. Most Basic languages do not include this feature. This line could be changed to set a flag which the main program could check. See Figure 1 for an example.

The second check is for ASCII value 13 which is the RETURN key, the normal exit from the subroutine. The IBM keyboard has two keys that can be used to erase characters from a line, the BACKSPACE key and the DEL key. ASCII value 8, the BACKSPACE key, is checked in line 140. The DEL key returns a two-character string when pressed. The ASCII value of the second character is 83. Line 150 checks for this key. If either keystroke is detected, a short routine is called.

This routine shortens INPT$ by one character, backs up the cursor, prints a space, and then backs up the cursor again. This has the effect of erasing one character from the screen. If the four checks are passed, then the character is added to INPT$ and printed. Line 170 is needed because the INKEY$ function does not automatically display the keystroke on the screen.

Checking The Date

Often a program requires a knowledge of the present date. IBM Basic has a DATE$ function. However, if the operator makes an incorrect input while setting the date, Basic prints an error message and crashes.

I needed the ability to check operator input, to generate the appropriate error message (Where have I seen that before?), and to allow the operator to correct the mistake. I also needed the month, day, and year in separate variables. The subroutine in Listing 4 provides these features. It uses the other subroutines that we have already developed.

The format for the date that is checked by this subroutine is MM/DD/YYYY or MM-DD-YYYY. The date to be checked is contained in DTE$. The INSTR function in line 1130 searches for the location of the first occurrence of a slash character. The same function could be accomplished with the following loop:

```
1135 IF MID$(DTE$,Y,1)="/" THEN
       1200
1140 NEXT Y
```

If no slash is found, the INSTR function

```
                        SUBROUTINE
                            .
                            .
                            .
120 IF ASC(I$)=27 THEN FLAG=1 : RETURN
                            .
                            .
                       MAIN PROGRAM
                            .
                            .
                            .
1675 FLAG=0
1680 GOSUB 70   'INPUT ROUTINE
1685 IF FLAG=1 THEN 1640   'GO TO MAIN MENU
```

Figure 1.

returns a zero, and the first occurrence of a hyphen is checked. If no hyphen is found, the error printing routine is called.

If a slash is found, line 1200 extracts the substring containing the month. This substring is sent to the number checking routine and then is checked to see if it is a valid month.

Lines 1290 and 1310 look for the second occurrence of a slash or a hyphen. The substring containing the day is extracted and is run through the same checks. Finally, the same procedure is used to isolate and check the year.

If all checking is successful, the date is broken into the variables MO, DAY, and YEAR before the subroutine returns to the main program.

Manipulating Time

Now let's manipulate time. In several programs that I have written, the operator has been required to wait while a long sort or file transfer takes place. The time delay has been dependent upon the number of records being handled. The time to process a single record can be estimated.

The total transaction time can be calculated based on the number of records times the single record processing time. Then it is a simple matter to provide the operator with an indication of the time required to complete the entire process. Listing 5 does this.

The only information needed by the subroutine is S, the total number of seconds for the entire transaction. The subroutine calculates the hours and minutes.

It converts these separate values into strings for concatenation (that means stick them together into one thing) into HH:MM:SS format.

Unfortunately, IBM Basic places a space in front of each number when converting it to a string. The routine in Lines 730-800 strips away the space and adds a zero to any value that is only one digit long.

Finally, Line 710 puts the whole mess together. That's concatenation! This can be printed in an appropriate message telling the operator to go get a cup of coffee.

Since IBM Basic has an internal clock accessible through the TIME$ function, I carried the subroutine one step farther and calculated the time at which the process would be finished.

This is done by separating TIME$ into hours, minutes, and seconds; adding the transaction time to these values; and reconverting the total to HH:MM:SS format. Lines 330-520 adjust the date if the total transaction time exceeds 24 hours. The subroutine uses the Date Check subroutine (Listing 4) to separate today's date, which is stored by the internal IBM clock in DATE$, into DAY, MO, and YEAR variables.

To show how these subroutines can interact with one another, I have written a simple program that asks for the date and time, prints out the separated date and then calculates a file transfer time. See Listing 6. Remember that error messages appear in reverse video at the bottom of the screen.

I hope that you can apply these routines and their underlying principles to the programs that you develop for your computer. Perhaps they will save you the trouble of reinventing a wheel or two while keeping your programming efforts rolling merrily along. □

Listing 1.

```
960 '***** PRINT ERROR MESSAGE *****
970 KEY OFF
980 MISTAKE=1
990 BEEP : BEEP
1000 LOCATE 25,1,0
1010 COLOR 0,7 ' REVERSE VIDEO
1020 PRINT LEFT$(ERRMSG$,WIDE);STRING$(WIDE-POS(0),32);
1030 COLOR 7,0 'NORMAL IMAGE
1040 LOCATE ROW,COL
1050 PRINT STRING$(WIDE-COL+1,32)
1060 LOCATE ROW,COL
1070 RETURN
1080 '***** END OF ERROR MESSAGE  *****
```

Listing 2.

```
820 '***** NUMBER CHECK *****
830 MISTAKE=0
840 LOCATE 25,1,0
850 PRINT BLANK$;
860 FOR Z=1 TO LEN(CHECK$)
870 N$=MID$(CHECK$,Z,1)
880 IF ASC(N$)=>48 AND ASC(N$)<=57 THEN 900
890 IF N$<>"." THEN 920
900 NEXT Z
910 RETURN
920 ERRMSG$="Sorry! Digits only, please."
930 GOSUB 960 ' PRINT ERROR MESSAGE
940 RETURN
950 '***** END NUMBER CHECK
```

Listing 3.

```
 70 '***** INPUT ROUTINE *****
 80 INPT$=""
 90 LOCATE,,1,6,7
100 I$=INKEY$
110 IF I$="" THEN 100
120 IF ASC(I$)=27 THEN RETURN 1640 ' ESC
130 IF ASC(I$)=13 THEN PRINT :RETURN ' <CR>
140 IF ASC(I$)=8 THEN GOSUB 190 : GOTO 100 'BCKSP KEY
150 IF LEN(I$)=2 THEN IF ASC(RIGHT$(I$,1))=83 THEN
    GOSUB 190 : GOTO 100 ' DEL KEY
160 INPT$=INPT$+I$
170 PRINT I$;
180 GOTO 100
190 INPT$=LEFT$(INPT$,LEN(INPT$)-1)
200 LOCATE CSRLIN,POS(0)-1
210 PRINT " ";
220 LOCATE CSRLIN,POS(0)-1
230 RETURN
240 '***** END INPUT *****
```

Listing 4.

```
1090 '***** DATE CHECK *****
1100 LOCATE 25,1,0 :PRINT BLANK$;
1110 MISTAKE=0
1120 Y1$=DTE$
1130 Y= INSTR(DTE$,"/")
1140 IF Y<>0 THEN 1200
1150 Y=INSTR(DTE$,"-")
1160 IF Y<>0 THEN 1200
1170 ERRMSG$="Please use MM/DD/YYYY format."
1180 GOSUB 960 ' PRINT ERROR MESSAGE
1190 RETURN
1200 CHECK$=MID$(DTE$,1,Y-1)
1210 GOSUB 820 ' NUMBER CHECK
1220 IF MISTAKE=1 THEN RETURN
1230 MO=VAL(CHECK$)
1240 IF MO>0 AND MO<13 THEN 1280
1250 ERRMSG$="The month must be between 1 and 12."
1260 GOSUB 960 ' PRINT ERROR MESSAGE
1270 RETURN
1280 Y1=Y+1
1290 Y= INSTR(Y1,DTE$,"/")
1300 IF Y<>0 THEN 1360
1310 Y=INSTR(Y1,DTE$,"-")
1320 IF Y<>0 THEN 1360
1330 ERRMSG$="Please use MM/DD/YYYY formCLS
1340 GOSUB 960 ' print error message
1350 RETURN
1360 CHECK$=MID$(DTE$,Y1,Y-Y1)
1370 GOSUB 820 ' NUMBER CHECK
1380 IF MISTAKE=1 THEN RETURN
1390 DAY=VAL(CHECK$)
1400 IF DAY>0 AND DAY<32 THEN 1440
1410 ERRMSG$="I only know days between 1 and 31."
1420 GOSUB 960 ' print error message
1430 RETURN
1440 CHECK$=MID$(DTE$,Y+1,LEN(DTE$))
1450 GOSUB 820 ' NUMBER CHECK
1460 IF MISTAKE=1 THEN RETURN
1470 IF LEN(CHECK$)=4 THEN 1510
1480 ERRMSG$="The year must be 4 digits long."
1490 GOSUB 960 ' PRINT ERROR MESSAGE
1500 RETURN
1510 YEAR=VAL(CHECK$)
1520 LOCATE ROW+1,1
1530 RETURN
1540 '***** END OF DATE ROUTINE *****
```

Listing 5.

```
250 '***** TIME CALCULATION *****
260 GOSUB 600
270 PRINT :PRINT "The transfer will take ";T$;"
    (H:M:S)"
280 PRINT :PRINT "The present time is ";TIME$
290 S=S+VAL(RIGHT$(TIME$,2))
300 S=S+60*(VAL(MID$(TIME$,4,2))+M)
310 S=S+3600*(VAL(LEFT$(TIME$,2))+H)
320 GOSUB 600
330 DTE$=DATE$
340 ROW=CSRLIN : COL=POS(0)
350 GOSUB 1090 ' DATE CHECK
360 DT$=""
370 IF H<=24 THEN 410
380 H=H-24 :GOSUB 650
390 DAY=DAY+1
400 GOTO 370
410 IF DAY <=31 THEN 440
420 DAY=DAY-31
430 MO=MO+1
440 IF MO<=12 THEN 470
450 MO=MO-12
460 YEAR=YEAR+1
470 T1$=STR$(DAY) : GOSUB 740
480 DAY$=T2$
490 T1$=STR$(MO) : GOSUB 740
500 MO$=T2$
510 T1$=STR$(YEAR) : GOSUB 740 : YR$=T2$
520 DT$=MO$+"/"+DAY$+"/"+YR$
530 PRINT :PRINT "The transfer will end at ";T$;"
    ";DT$
540 PRINT :PRINT "Do you wish to start the transfer
    (YES or NO) ";
550 GOSUB 70 ' INPUT
560 IF LEFT$(INPT$,1)<>"y" AND LEFT$(INPT$,1)<>"Y"
    THEN STOP
570 PRINT :PRINT "All done!!!"
580 RETURN
590 '***** CONVERT SEC TO H:M:S *****
600 T$=""
610 M=INT(S/60)
620 H=INT(S/3600)
630 M=M-H*60
640 S=S-(H*3600+M*60)
650 T1$=STR$(H) : GOSUB 740
660 H$=T2$
670 T1$=STR$(M): GOSUB 740
680 M$=T2$
690 T1$=STR$(S): GOSUB 740
700 S$=T2$
710 T$=H$+":"+M$+":"+S$
720 RETURN
730 '***** STRIP SPACES & ADD 0 *****
740 T2$=""'ELIMINATE SPACES
750 FOR Z=1 TO LEN(T1$)
760 IF MID$(T1$,Z,Z)=" " THEN 780
770 T2$=T2$+MID$(T1$,Z,1)
780 NEXT Z
790 IF LEN(T2$)<2 THEN T2$="0"+T2$
800 RETURN
810 '***** END OF TIME ROUTINE *****
```

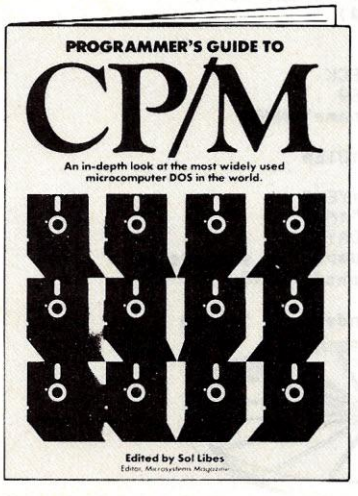
Listing 6.

```
 10 SCREEN 0,0,0
 20 WIDE=40 ' VARIABLE CONTAINING DISPLAY WIDTH
 30 BLANK$ = SPACE$(WIDE-1) 'SPACES
 40 KEY OFF
 50 WIDTH (WIDE) 'SETS DISPLAY WIDTH
 60 GOTO 1550
 70 '***** INPUT ROUTINE *****
 80 INPT$=""
 90 LOCATE,,1,6,7
100 I$=INKEY$
110 IF I$="" THEN 100
120 IF ASC(I$)=27 THEN RETURN 1640 ' ESC
130 IF ASC(I$)=13 THEN PRINT :RETURN ' <CR>
140 IF ASC(I$)=8 THEN GOSUB 190 : GOTO 100 'BCKSP KEY
150 IF LEN(I$)=2 THEN IF ASC(RIGHT$(I$,1))=83 THEN
    GOSUB 190 : GOTO 100 ' DEL KEY
160 INPT$=INPT$+I$
170 PRINT I$;
180 GOTO 100
190 INPT$=LEFT$(INPT$,LEN(INPT$)-1)
```


PROGRAMMER'S GUIDE TO CP/M

Edited by Sol Libes

Here's an important collection of CP/M insights that you'll never find in any CP/M manual. CP/M is the most popular microcomputer DOS in use today, and this widespread use has generated many innovative techniques and enhancements of CP/M. *Programmer's Guide to CP/M* tells you what these enhancements are and how to put them to use, how to get around apparent limitations of a CP/M system and why CP/M is far more versatile than you might have imagined. Every article in *Programmer's Guide to CP/M* originally appeared in MICROSYSTEMS between January 1980 and February 1982. Except for this collection, these articles are now unavailable! *Programmer's Guide to CP/M* gives you an in-depth look at CP/M from the viewpoint of the programmer—the individual who creates the software that interfaces directly with CP/M, or who is installing CP/M on systems for which configurations do not already exist.



Contents include "An Introduction to CP/M," "The CP/M Connection," "CP/M Software Reviews," "CP/M Utilities & Enhancement," "CP/M 86" and "CP/M Software Directories." 200 pages, $12.95.

creative computing
Dept.HA3H, 39 East Hanover Avenue
Morris Plains, NJ 07950

Send me _____ copies of *Programmer's Guide to CP/M* at $12.95 each, plus $2 for postage and handling. # **14C**

Foreign orders (except Canada and Mexico) add $3 for postage and handling. Shipped airmail only.

☐ **PAYMENT ENCLOSED** $_____. (NJ residents add 5% sales tax.)

☐ **CHARGE MY:**
☐ American Express ☐ MasterCard ☐ Visa

Card No._____

Exp. Date_____

Signature_____

Print Name_____

Address_____ Apt._____

City_____

State_____ Zip_____

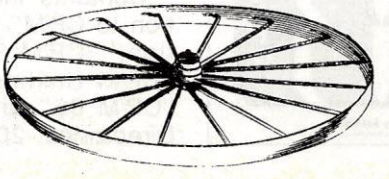
For faster service,
CALL TOLL FREE: 800-631-8112
(In NJ only, call 201-540-0445)
Please refer to Dept. **HA3H** when ordering.

☐ Check here for FREE catalog.

Institutions only—
purchase orders under $50 not accepted.

Wheels, continued...

```
200 LOCATE CSRLIN,POS(0)-1
210 PRINT " ";
220 LOCATE CSRLIN,POS(0)-1
230 RETURN
240 '***** END INPUT *****
250 '***** TIME CALCULATION *****
260 GOSUB 600
270 PRINT :PRINT "The transfer will take
    ";T$;" (H:M:S)"
280 PRINT :PRINT "The present time is ";TIME$
290 S=S+VAL(RIGHT$(TIME$,2))
300 S=S+60*(VAL(MID$(TIME$,4,2))+M)
310 S=S+3600*(VAL(LEFT$(TIME$,2))+H)
320 GOSUB 600
330 DTE$=DATE$
340 ROW=CSRLIN : COL=POS(0)
350 GOSUB 1090 ' DATE CHECK
360 DT$=""
370 IF H<=24 THEN 410
380 H=H-24 :GOSUB 650
390 DAY=DAY+1
400 GOTO 370
410 IF DAY <=31 THEN 440
420 DAY=DAY-31
430 MO=MO+1
440 IF MO<=12 THEN 470
450 MO=MO-12
460 YEAR=YEAR+1
470 T1$=STR$(DAY) : GOSUB 740
480 DAY$=T2$
490 T1$=STR$(MO) : GOSUB 740
500 MO$=T2$
510 T1$=STR$(YEAR) : GOSUB 740 : YR$=T2$
520 DT$=MO$+"/"+DAY$+"/"+YR$
530 PRINT :PRINT "The transfer will end at
    ";T$;" ";DT$
540 PRINT :PRINT "Do you wish to start the
    transfer (YES or NO) ";
550 GOSUB 70 ' INPUT
560 IF LEFT$(INPT$,1)<>"y" AND LEFT$(INPT$,1)<>"Y"
    THEN STOP
570 PRINT :PRINT "All done!!!"
580 RETURN
590 '***** CONVERT SEC TO H:M:S *****
600 T$=""
610 M=INT(S/60)
620 H=INT(S/3600)
630 M=M-H*60
640 S=S-(H*3600+M*60)
650 T1$=STR$(H) : GOSUB 740
660 H$=T2$
670 T1$=STR$(M): GOSUB 740
680 M$=T2$
690 T1$=STR$(S): GOSUB 740
700 S$=T2$
710 T$=H$+":"+M$+":"+S$
720 RETURN
730 '***** STRIP SPACES & ADD 0 *****
740 T2$=""'ELIMINATE SPACES
750 FOR Z=1 TO LEN(T1$)
760 IF MID$(T1$,Z,Z)=" " THEN 780
770 T2$=T2$+MID$(T1$,Z,1)
780 NEXT Z
790 IF LEN(T2$)<2 THEN T2$="0"+T2$
800 RETURN
810 '***** END OF TIME ROUTINE *****
820 '***** NUMBER CHECK *****
830 MISTAKE=0
840 LOCATE 25,1,0
850 PRINT BLANK$;
860 FOR Z=1 TO LEN(CHECK$)
870 N$=MID$(CHECK$,Z,1)
880 IF ASC(N$)=>48 AND ASC(N$)<=57 THEN 900
890 IF N$<>"." THEN 920
900 NEXT Z
910 RETURN
920 ERRMSG$="Sorry! Digits only, please."
930 GOSUB 960 ' PRINT ERROR MESSAGE
940 RETURN
950 '***** END NUMBER CHECK
960 '***** PRINT ERROR MESSAGE *****
970 KEY OFF
980 MISTAKE=1
990 BEEP : BEEP
1000 LOCATE 25,1,0
1010 COLOR 0,7 ' REVERSE VIDEO
1020 PRINT LEFT$(ERRMSG$,WIDE);STRING$
     (WIDE-POS(0),32);
1030 COLOR 7,0 'NORMAL IMAGE
1040 LOCATE ROW,COL
1050 PRINT STRING$(WIDE-COL+1,32)
1060 LOCATE ROW,COL
1070 RETURN
1080 '***** END OF ERROR MESSAGE  *****
1090 '***** DATE CHECK *****
1100 LOCATE 25,1,0 :PRINT BLANK$;
1110 MISTAKE=0
1120 Y1$=DTE$
1130 Y= INSTR(DTE$,"/")
1140 IF Y<>0 THEN 1200
1150 Y=INSTR(DTE$,"-")
1160 IF Y<>0 THEN 1200
1170 ERRMSG$="Please use MM/DD/YYYY format."
1180 GOSUB 960 ' PRINT ERROR MESSAGE
1190 RETURN
1200 CHECK$=MID$(DTE$,1,Y-1)
1210 GOSUB 820 ' NUMBER CHECK
1220 IF MISTAKE=1 THEN RETURN
1230 MO=VAL(CHECK$)
1240 IF MO>0 AND MO<13 THEN 1280
1250 ERRMSG$="The month must be between 1 and 12."
1260 GOSUB 960 ' PRINT ERROR MESSAGE
1270 RETURN
1280 Y1=Y+1
1290 Y= INSTR(Y1,DTE$,"/")
1300 IF Y<>0 THEN 1360
1310 Y=INSTR(Y1,DTE$,"-")
1320 IF Y<>0 THEN 1360
1330 ERRMSG$="Please use MM/DD/YYYY formCLS
1340 GOSUB 960 ' print error message
1350 RETURN
1360 CHECK$=MID$(DTE$,Y1,Y-Y1)
1370 GOSUB 820 ' NUMBER CHECK
1380 IF MISTAKE=1 THEN RETURN
1390 DAY=VAL(CHECK$)
1400 IF DAY>0 AND DAY<32 THEN 1440
1410 ERRMSG$="I only know days between 1 and 31."
1420 GOSUB 960 ' print error message
1430 RETURN
1440 CHECK$=MID$(DTE$,Y+1,LEN(DTE$))
1450 GOSUB 820 ' NUMBER CHECK
1460 IF MISTAKE=1 THEN RETURN
1470 IF LEN(CHECK$)=4 THEN 1510
1480 ERRMSG$="The year must be 4 digits long."
1490 GOSUB 960 ' PRINT ERROR MESSAGE
1500 RETURN
1510 YEAR=VAL(CHECK$)
1520 LOCATE ROW+1,1
1530 RETURN
1540 '***** END OF DATE ROUTINE *****
1550 '***** START OF MAIN PROGRAM *****
1560 CLS :PRINT :PRINT
1570 PRINT "        HELLO, THERE!"
1580 GOTO 1610
1590 INPUT "What time is it (HH:MM)";TM$
1600 TIME$=TM$
1610 PRINT : PRINT "Is this the correct time
     (YES or NO) ";TIME$;" ";
1620 INPUT INPT$
1630 IF LEFT$(INPT$,1)<>"Y" AND LEFT$(INPT$,1)<>"y"
     THEN 1590
1640 PRINT :PRINT
1650 PRINT "What is today'date"
1660 PRINT "Use MM/DD/YYYY format => ";
1670 ROW=CSRLIN :COL=POS(0)
1680 GOSUB 70 ' INPUT
1690 DTE$=INPT$
1700 GOSUB 1090 ' DATE CHECK
1710 IF MISTAKE=1 THEN 1680
1720 INPUT "What is your name";NME$
1730 PRINT :PRINT
1740 PRINT "The date is ";DTE$

1750 PRINT "The year is ";YEAR
1760 PRINT "The month is ";MO
1770 PRINT "The day is ";DAY
1780 INPUT "Give me the number of seconds to
     complete the file transfer ";S
1790 GOSUB 250
1800 PRINT "Isn't that wonderful, ";NME$
1810 END
```



January 1983 © Creative Computing

FINALLY.
Your Own Weekly Television Show.

TM

Personal Computing News/Special Features
New Product Reports/ Games & Entertainment

Every Thursday Evening
Satellite Program Network (SPN)
7:30 Eastern/6:30 Central/4:30 Pacific

THE PERSONAL COMPUTER SHOW
3740 Colony Drive Suite 130 San Antonio TX 78230

CIRCLE 235 ON READER SERVICE CARD

From Computer Plus to YOU . . .

PLUS after PLUS after PLUS

Model 16 128K
1 Drive $4199
2 Drive $4799

Color Computer 16K $249
w/16K Ext. Basic $335
w/32K Ext. Basic $449

Model III 16K $799
Model III 48K
2 Disk & RS232 c $1899

Okidata 80 $325
Okidata 82A $425
Okidata 84 $1029

Color Computer Disk Drive
Drive 0 $470 Drive 1 $315

Smith Corona TPI
Daisy Wheel $599

BUY DIRECT *Here are just a few of our fine offers . . . call TOLL FREE for full information.*

COMPUTERS	
Model II 64K	$2999
Model III 4K LEV I	599
MODEL III 16K	799
MODEL III 32K	856.50
*MODEL III 32K	831.50
MODEL III 48K	914
*MODEL III 48K	864
Model III 48K	
2 Disk & RS232 c	1899
Color Computer 16K	249
Color Computer 16K w/extended basic	335
Color Computer 32K w/extended basic	449
‡Color Computer 32K-64K w/extended basic	510
Pocket Computer 2	230
Model 16 1DR 128K	4199
Model 16 2DR 128K	4799
DT-1 Data Terminal	599
PT-210 Portable Terminal	779

MODEMS	
Lynx Direct Connect MI/MIII	235
Hayes Smart Modem II	235
R.S. Acoustic Coupler AC-3	134
R.S. Modem I D.C.	130
R.S. Modem II D.C.	210
PRINTERS	
Daisy Wheel II	1715
DWP-410	1335
Smith Corona TPI Daisy Wheel	599
Epson MX80	499
Epson MX80 FT	549
Epson MX100	735
CGP-115	199
DMP-100	315
DMP-200	599
DMP-400	1029
DMP-500	1569
Microline 80	325
Microline 82A	425
Microline 83A	679
Microline 84 Parallel	1029
P. C. Plotter Printer	199

DISK DRIVES	
R.S. Model III 1ST-Drive	679
Tandon 40 Track MI	289
Color Computer Drive 1	315
Color Computer Drive 0	470
Primary Hard Disk MII	3999
Primary Hard Disk MIII	1999
ETC.	
CCR-81 recorder	52
C. C Joysticks	22
16K RAM N.E.C. 200 N.S. chips	25
64K Ram Chips	75
Color Computer Flex D.O.S.	99
Brand Name Software • Send for listing.	
R.S. Software 10% off list	

*Computer Plus New Equipment, with NEC RAM installed. 180 Day Computer Plus Warranty.
‡Color Computer 64K requires Disk 0 and Flex D.O.S.

We have the lowest possible Fully Warranteed Prices AND a full complement of Radio Shack Software.

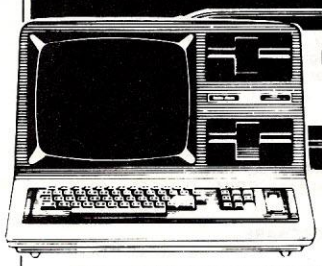
TOLL FREE 1-800-343-8124

computer plus
P.O. Box 926
480 King Street
Littleton, MA 01460
617-486-3193
Write for your free catalog

Prices subject to change without notice. Not responsible for typographical errors. TRS-80 is a registered trademark of Tandy Corp.

CIRCLE 143 ON READER SERVICE CARD

DISCOUNT TRS-80®



TRS-80 MODEL III
$1950 48-K 26-1066 **$819** 16-K 26-1062

TRS-80 MODEL II
$3000 64-K 26-4002

TRS-80 MODEL 16
$4825 128-K 26-6002

TRS-80 8.4 MEGABYTE HARD DISKS (PRIMARY UNIT) . . . $4000.

TRS-80 COLOR **$309** 16-K 26-3004 **$425** 16-K 26-3002 **$525** 32-K 26-3003

WE HAVE COLOR DISK DRIVES 0 — **$475** 1-2-3 — **$315**

WE ALSO CARRY EPSON AND OKIDATA PRINTERS, XEROX 820 AND ALTOS COMPUTERS.
NO OUT-OF-STATE TAXES. T.M. TANDY CORP.

Sold with the manufacturer's limited warranty. Copies of such warranty may be obtained for review from Perry Oil and Gas Co.

PERRY OIL & GAS INC.

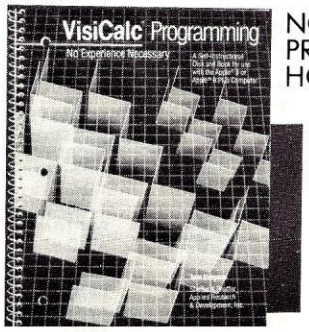
Dept. No. H-8 137 NORTH MAIN ST., PERRY, M CHIGAN 48872
PHONE (517) 625-4161, MICH

WE ACCEPT CERTIFIED CHECKS, CASHIERS CHECKS AND MONEY ORDERS.

FOR OUR PRICES, PLEASE CALL TOLL FREE
1-800-248-3823

CIRCLE 234 ON READER SERVICE CARD

HOURS NOT TO REASON WHY



NOW MASTER VISICALC® PROGRAMMING IN HOURS INSTEAD OF DAYS

Unique interactive software and easy-to-understand instructions for Apple II and Apple II Plus. In no time at all they'll have you and your VisiCalc® program humming along together. End the puzzlement. End the frustration. Send for *your* package today.

LITTLE, BROWN AND COMPANY

34 BEACON STREET, BOSTON, MA 02106

Send coupon to Janet W. Carlson, Little, Brown and Company
34 Beacon Street, Boston, MA 02106

Please send me *VisiCalc® Programming: No Experience Necessary.* by Tom Simpson.

☐ I enclose a check for $49.95 plus $2.50 shipping and handling (plus sales tax where applicable).

☐ Please charge my ☐ Master Charge ☐ VISA ☐ American Express

No. _____ Exp. Date _____

☐ I am a dealer. Please send additional info.

Name _____
Address _____
City _____ State _____ Zip _____

CIRCLE 195 ON READER SERVICE CARD

ATARI·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M

DISCOUNT DATA PRODUCTS

THINK ABOUT CHRISTMAS NOW!
THE PERFECT PRESENT
A GIFT CERTIFICATE
FROM
DISCOUNT DATA PRODUCTS
GIVE US A CALL!

COMPUTER STORE SERVICE AT MAIL ORDER PRICES

APPLE

		LIST PRICE	OUR PRICE
★ ACCENT SOFTWARE			
ADVENTURE INTERNATIONAL			
Commbat	D	24.95	19.95
Rear Guard	D	29.95	**23.95**
Tunnel Terror	D	29.95	23.95
War	D	24.95	19.95
S.A.G.A. #1-12 each	D	29.95	23.95
★ APPLIED SOFTWARE TECHNOLOGY			
★ ARTSCI ★ ASHTON-TATE			
★ ASTAR INTERNATIONAL CO.			
AUTOMATED SIMULATIONS			
Temple of apshai	D	39.95	31.95
Crush, Crumble & Chomp	D	29.95	23.95
Upper Reaches of Apshai	D	19.95	**15.95**
★ AVALON HILL GAME COMPANY			
AVANT-GARDE CREATIONS			
HI-RES Secrets	D	125.00	99.95
BEAGLE BROS.			
DOS Boss	D	24.00	19.20
Utility City	D	29.50	23.50
Alpha Plot	D	39.50	**31.95**
Tip Disk #1	D	20.00	15.95
Apple Mechanic	D	29.50	**20.95‡**
★ BEZ			
BRODERBUND SOFTWARE			
Apple Panic	D	29.95	23.95
The Arcade Machine	D	44.95	35.95
Star Blazer	D	31.95	**22.35‡**
Choplifter	D	34.95	27.95
Serpentine	D	34.95	27.95
HI-RES ADv. #1 - Dead. Sec.	D	34.95	27.85
Sea Fox	D	29.95	23.95
Hard Hat Noah	D	29.95	23.95
★ BUDGECO			
CALIFORNIA PACIFIC			
Bill Budge's 3D Graphics	D	39.95	31.95
Ultima	D	39.95	31.95
CAVALIER COMPUTER			
Bug Attack	D	29.95	**20.95‡**
Microwave	D	34.95	27.95
★ COMSHARE TARGET			
CONTINENTAL SOFTWARE			
The Home Accountant	D	74.95	**52.45‡**
1st Class Mail	D	74.95	59.95
CPA Modules #1-4 (each)	D	250.00	199.95
★ CPU SOFTWARE			
DAKIN 5/LEVEL 10			
Worm Hole	D	29.95	**20.95‡**
DATAMOST			
Snack Attack	D	29.95	23.95
Thief	D	29.95	23.95
Swashbuckler	D	34.95	**28.95**
Money Muncher	D	29.95	23.95
Vortex	D	29.95	23.95
Pandora's Box	D	29.95	23.95
★ DATASOFT			
★ DENVER SOFTWARE			
★ DON'T ASK SOFTWARE			
★ DOUBLE GOLD SOFTWARE			
EDU-WARE			
Statistics	D	29.95	23.95
Spelling Bee w/Read. Primer	D	39.95	31.95
Algebra 1	D	39.95	31.95
Algebra 2	D	39.95	31.95
Rendevous	D	39.95	31.95
GEBELLI SOFTWARE			
Zenith	D	34.95	27.95
Phaser Fire	D	29.95	23.95
High Orbit	D	29.95	23.95
★ HAYDEN SOFTWARE			
★ HAYES MICROCOMPUTER PRODUCTS			
★ HIGHLANDS COMPUTER SERVICES			
HOWARD SOFTWARE			
Creative Financing	D	195.00	155.95
NY/NJ State Tax	D	75.00	59.95
California State Tax	D	75.00	59.95
Tax Preparer '82	D	150.00	**104.95‡**
INFOCOM			
Zork I	D	39.95	31.95
Zork II	D	39.95	31.95
Deadline	D	49.95	39.95
★ INNOVATIVE DESIGN SOFTWARE			
INSOFT			
GraForth II	D	75.00	**52.50‡**
Electric Duet	D	29.95	23.95
★ ISM ★ IUS ★ LAZER SYSTEMS			
KENSINGTON MICROWARE LTD.			
System Saver	A	89.95	71.95
LIGHTNING SOFTWARE			
Master Type	D	39.95	31.95
LOTUS/PST			
Decorative Fonts	D	24.95	19.95
Executive Briefing Systems	D	199.95	159.95
MICRO LAB			
Wall Streeter	D	300.00	239.95
MICROSOFT			
Olympic Decathlon	D	29.95	23.95
Typing Tutor II	D	24.95	19.95
TASC Compiler	D	175.00	139.95
FORTRAN-80	D	195.00	154.95
A.L.D.S.	D	125.00	99.95
MICROTEK			
BAM 16K Memory Board	A	139.95	119.85
Apple Parallel Inter	A	139.95	119.85
MUSE			
The Voice	D	39.95	**27.95‡**
Three Mile Island	D	39.95	31.95
Robot War	D	39.95	31.95
Castle Wolfenstein	D	29.95	23.95
Supertext 40/56/80	D	125.00	99.95
ON-LINE SYSTEMS			
HI-RES Adv. #2 - Wiz & Prin.	D	32.95	**23.05‡**
HI-RES Adv. #3 - Cranston M.	D	34.95	27.95
HI-RES Adv. #4 - Ulysess	D	34.95	**24.45‡**
HI-RES Adv. #5 - Time Zone	D	99.95	79.96
Mouskattack	D	34.95	27.95
Ultima II	D	59.95	**47.95**
Threshold	D	39.95	31.95
Pest Patrol	D	29.95	23.95
Lunar Leeper	D	29.95	23.95
The Artist	D	99.95	79.95
Frogger	D	34.95	27.95
E.P.F. IV	D	79.95	63.95
Cannonball Blitz	D	34.95	27.95
Expediter II +	D	135.95	108.75
General Manager	D	229.95	**183.95**
Screenwriter Pro. System	D	199.95	159.95
Screenwriter II	D	129.95	98.95
★ PEACHTREE			
PENGUIN SOFTWARE			
Complete Graphics Sys.	D	69.96	55.96
Special Effects	D	39.95	31.95
Graphics Magician	D	59.95	47.95
PICCADILLY			
Star Blaster	D	29.95	23.95
Ribbit	D	29.95	**29.95‡**
PHOENIX SOFTWARE			
The Birth of the Phoenix	D	22.00	17.50
Zoom Grafix	D	39.95	31.95
QUALITY SOFTWARE			
Bag of Tricks	D	39.95	31.95
Beneath Apple DOS	B	19.95	15.95
Ali Baba & 40 Thieves	D	32.95	26.35
SENSIBLE SOFTWARE			
Super Disk Copy III	D	30.00	23.95
Multi Disk Catalog III	D	25.00	19.95
Disk Recovery	D	30.00	23.95
Applesoft Program Opti.	D	20.00	15.95
Disk Organizer II	D	30.00	20.95
DOS Plus	D	25.00	19.95
Quickloader	D	25.00	19.95
Image Printer - Epson	D	40.00	31.95
Sensible Speller	D	125.00	99.95
Sensible Speller (Super Text)	D	125.95	99.95
Sensible Spel (Apple CP/M)	D	125.95	99.95
B.E.S.T.	D	40.00	31.95
SENTIENT SOFTWARE			
Cyborg	D	32.95	26.50
Congo	D	34.95	27.95
Goldrush	D	34.95	27.95
SIRIUS SOFTWARE			
Kabul Spy	D	34.95	27.95
Minotaur	D	34.95	27.95
Bandits	D	34.95	27.95
Escape From Rungistan	D	29.95	23.95
The Joyport	A	74.95	**52.47‡**
Freefall	D	29.95	23.95
Way Out	D	39.95	31.95
SIR-TECH SOFTWARE			
Wizardry	D	49.95	**34.95‡**
Knight of Diamonds (sc. #2)	D	34.95	27.95
SOFTWARE PUBLISHING CORP.			
PFS: Report (New Improved)	D	95.00	76.95
PFS: (New Improved)	D	125.00	99.95
PFS: Graph	D	125.00	99.95
★ SOUTHEASTERN SOFTWARE			
SOUTHWESTRN DATA SYSTEMS			
Ascii Pro	D	129.95	103.95
Correspondent	D	59.95	47.95
Merlin	D	64.95	51.95
The Routine Machine	D	64.95	51.95
Z-Term "The Pro"	D	150.00	119.95
P-Term	D	129.95	103.95
Munch-A-Bug	D	49.95	39.95

XEROX·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M·TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M

TRS-80·APPLE·ATARI·IBM·XEROX·PET·VIC·NEC·CP/M

An End to Black Holes and Venetian Blinds

PICTURE ZAPPER

William Tenney

While developing a game program in Applesoft recently, I came up against a rather thorny problem which left me stumped. My particular game requires a fairly complex hi-res game board across which pieces are moved by the players.

My thorny problem arises when moving a game piece from one position to another on the game board; the piece must be erased or xdrawn before it can be drawn in the next position. However, in doing this, part of the background of the game board itself is also erased, leaving a gaping black hole. Since my game is not of the interstellar or galactic warfare type, black holes are definitely not wanted.

There are a few options for overcoming this little problem with my 48K Apple II Plus. One, and perhaps the most obvious to the reader, is to plan always to have a black background for the game board, and to plan the size, shape, and positions of the game pieces so that they never overlap any other image elements.

This is fine, but since my game board is rather complicated with many small pieces on it, and since I am quite tired of seeing other game boards on black backgrounds, this option is less than satisfactory.

A second option is to redraw the game board after each move and then redraw the game pieces in their new positions. But with a complex board with many color blocks, lines, and figures, it takes a full minute to draw the board and all its parts—not practical at all to wait a full minute after each move before going on with the game.

William Tenney, 77 Wood St., Concord, MA 01742.

A third option is to store the entire game board image on the disk using a BSAVE command, and then to call it back to the hi-res screen using a BLOAD command. This works fine, but although the time of loading and drawing the game board is reduced from one minute to about thirteen seconds, the disk drive is in motion for each move of the game—far too much wear and tear on the disk and drive, and still too much time wasted waiting for the disk to turn on and draw the image on the screen with its venetian blind imitation.

So these three options proved to be unworkable for me from both hardware and aesthetic points of view. But, I thought to myself, why couldn't I attempt what the memory expansion boards are touting with their disk simulators? Couldn't I move the 8K hi-res image to another part of memory, store it there, and call it back to the same hi-res screen whenever I needed it, and faster than using a BLOAD?

To accomplish this from Basic was the problem, because all it would be was a simple memory move in the monitor. With this in mind, I wrote a short machine language program which very successfully does just what I wanted.

The Program

The program uses an Applesoft routine called COMBYTE which resides in $E74C (thanks to Roger Wagner for pointing it out). COMBYTE checks for a comma, reads the expression which follows, and returns with a single byte ($00 to $FF) in the X-register, which can then be stored in a zero-page location. The four zero-page locations used are shown in Figure 1.

The program cycles 32 times ($20 in line $0315), each pass reading and moving a 256-byte page of memory. It runs incredibly fast, moving all 32 pages, or an entire 8K image, in about .3 seconds.

Since I am using hi-res screen 2 ($4000 - $5FFF) for my game image, but need the region of the hi-res screen 1 for my program and variables, I decided that a good place to store my image would be right above hi-res screen 2, at $6000. This location is well below the HIMEM of

Figure 1.

Low byte of the source location = $06	(SOURCE-LO)
High byte of the source location = $07	(SOURCE-HI)
Low byte of the destination location = $08	(DESTIN-LO)
High byte of the destination location = $09	(DESTIN-HI)

$95FF (with DOS in effect), and since the image is $2000 bytes long, it does not bump into any string variables stored from HIMEM on down.

To use this routine from Applesoft—to move an image from hi-res screen 2 to the storage area at $6000—my syntax is as follows:

CALL 768,0,64,0,96

where 768 is equal to $300, the starting point of the routine, 0 is the SOURCE-LO, 64 is the SOURCE-HI (remember that 64 = $40), 0 is the DESTIN-LO, and 96 is the DESTIN-HI (96 = $60).

To move the image back to the hi-res screen 2 (while keeping it at the storage location as well), the syntax is

CALL 768,0,96,0,64

To really speed up your programming, you could set up a "&" hook:

POKE 1014,0: POKE 1015,3

which sets a Jump instruction to $300 Then your syntax would be

&,0,64,0,96 and &,0,96,0,64

Now I can erase a game piece by redrawing the entire game board using this routine, and then draw the game pieces in their respective places, all in less than a second. The game proceeds at a good clip.

Of course, this short program can be used to move any block of memory anywhere, since it is merely a memory move routine. You need only work in blocks of 256 bytes and know the starting point and number of memory pages (store this number in $0315).

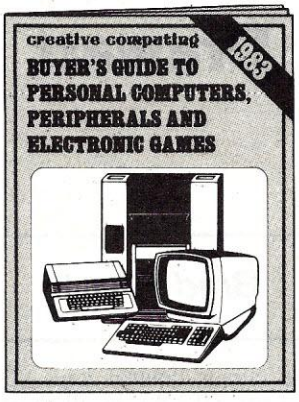
A low-res image, for example, is only four pages long. The machine language coding is completely relocatable to any spare 40 bytes of memory (remember that at a different location your CALL would be to the start of your routine). Try it, you'll like it. For moving pictures around, the program is superb—and no more black holes or venetian blinds. □

Listing 1. Picture Zapper.

```
0300-  20 4C E7    JSR  $E74C
0303-  86 06       STX  $06
0305-  20 4C E7    JSR  $E74C
0308-  86 07       STX  $07
030A-  20 4C E7    JSR  $E74C
030D-  86 08       STX  $08
030F-  20 4C E7    JSR  $E74C
0312-  86 09       STX  $09
0314-  A2 20       LDX  #$20
0316-  A9 00       LDA  #$00
0318-  A8          TAY
0319-  B1 06       LDA  ($06),Y
031B-  91 08       STA  ($08),Y
031D-  C8          INY
031E-  D0 F9       BNE  $0319
0320-  E6 07       INC  $07
0322-  E6 09       INC  $09
0324-  CA          DEX
0325-  D0 F2       BNE  $0319
0327-  60          RTS
```


NEED HELP BUYING A COMPUTER OR PERIPHERAL?

GET THE GUIDE!



BUYER'S GUIDE TO PERSONAL COMPUTERS, PERIPHERALS AND ELECTRONIC GAMES

Features include:

- Which computer is for you
- Evaluations of personal computers
- Tips on buying peripherals
- Peripheral product reviews
- Music synthesizers
- Comprehensive evaluation of joysticks, paddles and game port extenders
- Video game systems and software
- Roundup of electronic toys and games
- Electronic and computerized learning aids
- Video products for computer users
- Selected microprocessor-based consumer electronics products

ORDER YOUR COPY OF THIS COMPREHENSIVE GUIDE TODAY!

HERE'S HOW TO ORDER

Send your name, address and $5.00 ($3.95* plus $1.05 postage and handling) to:

Buyer's Guide to Personal Computers
P.O. Box 640, Holmes, PA 19043

Please make check payable to:

Buyer's Guide to Personal Computers

*NJ residents add 5% sales tax.
Price outside U.S.A. $6.00.

LIMITED-TIME CLEARANCE

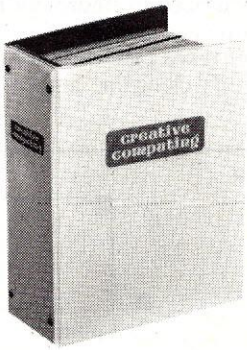
SALE 50% OFF!

ON THESE HANDSOME

creative computing

BACK ISSUE

BINDERS



Are your back issues of *Creative Computing* stacked in piles? In boxes? Is the one you want always missing? If so, you need our binders. Made of vinyl with the *Creative Computing* logo silk screened on front and spine, they're a handsome way to keep your back issues safe and intact. Each holds 12 issues with sturdy locking wire posts. And now you can have them at HALF PRICE: from now until February 28, 1983 each binder is only $3.00—after that they go back to their regular price of $6.00 each. Act today, this offer won't be repeated and ends February 28, 1983.

creative computing
Dept. HA1C, 39 East Hanover Avenue, Morris Plains, NJ 07950

☐ Please send me **Creative Computing** Binders at the special Warehouse Clearing Sale price of just $3.00 per binder. (Offer good only until February 28, 1983.)

☐ **PAYMENT ENCLOSED** $_____ (NJ residents add 5% sales tax.) Add $1.per order for postage and handling in USA. Outside USA add $2.50 per unit ordered. Send U.S. funds only.

☐ **CHARGE MY:** ☐ American Express ☐ MasterCard ☐ Visa

Card No._____ Exp. Date_____

Signature_____

Mr./Mrs./Ms._____
(please print full name)

Address_____

City_____ State_____ Zip_____

For faster service, PHONE TOLL FREE 800-631-8112. (In N.J. only 201-540-0445.) Please refer to Dept. HA1C when ordering.

Drawart

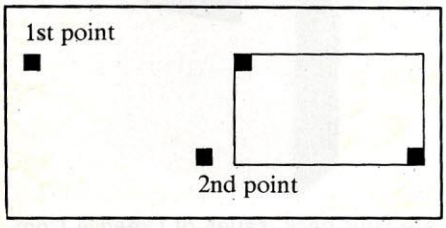
Brad Pitzel

The TRS-80 is not a great graphics machine, but with the help of the following short program, you can easily create some amazing displays. Drawart is a masterpiece in simplicity.

No longer do you have to sit down and plot each pixel that makes up a circle. Nor do you need to figure out the equation of a line just to draw it.

Drawart takes care of these problems and more. By using one-letter commands and the cursor control keys, Drawart makes your TRS-80 do all the tedious work; leaving you more time to be creative.

Figure 1.



Brad Pitzel, 122 Meadowbrook Dr., Nova Scotia, Canada.

The commands are as follows:

Cursor Control: Pressing one of the arrow keys will move the cursor in the direction indicated on the key. You can't press more than one key at a time.

Draw/Erase Mode: The cursor in Drawart can be set in either the draw or erase mode. Pressing the spacebar reverses the current mode.

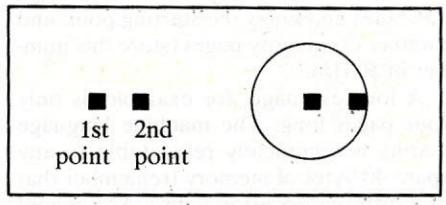
Lines: To enter the line mode, press L. Once you are in this mode, you must plot two points by using the spacebar and the arrow keys. Press G and these dots will be connected by a straight line in the order in which they were plotted.

Rectangles: Pressing R places you in the rectangle mode. By using the cursor control keys and the spacebar, plot two dots. After you plot the second dot, the computer will fill in the area between the two dots.

Circles: Press C to enter the circle mode. Plot two dots that have the same Y axis. The first point is the center of your circle and the second designates the radius.

Block Move: To store the ASCII values of the entire screen into the memory addresses 26000 to 27023, press P. You can then continue drawing. □

Figure 2.



Listing 1.

```
10 CLS : CLEAR : DIM X(255), Y(255), Q(40), W(40)
20 Q=64 : W=24 : SET (Q,W) : X(32)=-1 : X(64)=1
25 Y(8)=-1 : Y(16)=1 : R=1
30 GOSUB 1000 : IF FK=1 THEN R=-R
40 A$=INKEY$ : IFA$="" THEN 30
50 IF A$="L" THEN 2000
60 IF A$=CHR$(31) THEN CLS
70 IF A$="R" THEN 4000
80 IF A$="C" THEN 5000
90 IF A$="P" THEN 6000
100 GOTO 30
1000 FK=0 : A=PEEK(14400) : IF A=0 THEN RETURN
1010 IF R=-1 THEN RESET (Q,W)
1020 Q1=Q : W1=W : Q=Q+X(A) : W=W+Y(A)
1025 IF Q<0 Q=Q+128 ELSE IF Q>127 Q=Q-128
1026 IF W<0 W=W+48 ELSE IF W>47 W=W-48
1030 FK=0 : IF A=128 FOR ZA=1 TO 30 : NEXT : FK=1
1040 SET(Q,W) : RETURN
2000 R=-1 : T=0
2010 GOSUB 1000 : IF INKEY$="G" THEN 2040
2015 IF R=1 AND (Q(T)<>Q OR W(T)<>W) THEN R=-R
2020 IF FK=0 THEN 2010
2030 R=1 : IF Q=Q(T) AND W=W(T) THEN 2010
2035 T=T+1 : Q(T)=Q : W(T)=W : IF T<40 THEN 2010
2040 IF T<2 THEN 30
2050 FOR GT=1 TO T-1 : X=Q(GT) : Y=W(GT)
2055 X1=Q(GT+1) : Y1=W(GT+1)
2060 GOSUB 3000 : NEXT : GOTO 30
3000 IF ABS(X1-X) < ABS(Y1-Y) THEN 3070
3010 FOR X2=X TO X1 STEP 2*(X1<X)+1
3020 SET(X2,(X2-X)*(Y1-Y)/(X1-X)+Y+.5)
3030 NEXT : RETURN
3070 FOR Y2=Y TO Y1 STEP 2*(Y1<Y)+1
3080 SET(.5+(Y2-Y)*(X1-X)/(Y1-Y)+X,Y2)
3090 NEXT : RETURN
4000 R=-1 : T=0
4010 GOSUB 1000
4015 IF R=1 AND (Q(T)<>Q OR W(T)<>W) R=-1
4020 IF FK=0 THEN 4010
4030 R=1 : IF Q=Q(T) AND W=W(T) THEN 4010
4035 T=T+1 : Q(T)=Q : W(T)=W : IF T=1 THEN 4010
4040 FOR I=Q(1) TO Q(2) STEP SGN(Q(2)-Q(1))
4050 FOR J=W(1) TO W(2) STEP SGN(W(2)-W(1))
4060 SET(I,J) : NEXT J,I : GOTO 30
5000 R=-1 : T=0
5010 GOSUB 1000
5015 IF R=1 AND (Q(T)<>Q OR W(T)<>W) R=-1
5020 IF FK=0 THEN 5010
5030 R=1 : IF Q=Q(T) AND W=W(T) THEN 5010
5035 T=T+1 : Q(T)=Q : W(T)=W : IF T=1 THEN 5010
5040 X=ABS(Q(1)-Q(2)) : Y=X*3/7
5045 KX=Q(1) : KY=W(2)
5050 T=Y*7/3 : IF X>T THEN T=X
5060 FOR HJ=0 TO 2*3.1415 STEP 1/T
5070 Z1=COS(HJ)*X+KX : Z2=SIN(HJ)*Y+KY
5075 IFZ1<0 OR Z1>127 OR Z2<0 OR Z2>47 THEN 5090
5080 SET(Z1,Z2)
5090 NEXT : GOTO 30
6000 FOR I=15360 TO 16383
6005 POKE I+10640, PEEK(I) : NEXT
6010 CLS : FOR I=15360 TO 16383
6015 POKE I, PEEK(I+10640) : NEXT
6020 GOTO 30
```

NEW from MUSE Software

INTRODUCING

The Sensational Program

KNOW YOUR APPLE™

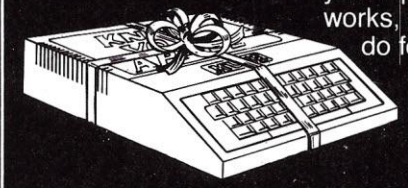
Instant Pleasure!

Delight Your Friends!

Educational Fun!

Gift Packaged!

1. **Instant Pleasure:** Set up your Apple®, turn on the program, and enjoy your computer instantly!
2. **Amaze and Delight your Friends:** Whether you're a new or long-time Apple owner, you can astonish your friends by letting them sit right down and enjoy your Apple, too!
3. **Educational:** Gain instant knowledge about your Apple…how it works, and what it can do for you!



4. **Gift Packaged:** An excellent gift for any Apple owner; for personal gifts, birthdays, and Christmas giving.
5. **Collector's Item:** The box is a unique miniature replica of the Apple computer at no extra charge.

Everyone should have a "Know Your Apple"! "Without one, you'll be a 'byte' away from total Apple pleasure!"

PRICE: $

Available now from dealers and distributors nationwide or from Muse Software.

For Apple II with 48K and disk drive.

Apple is a registered trademark of Apple Computer, Inc.

MUSE™ SOFTWARE

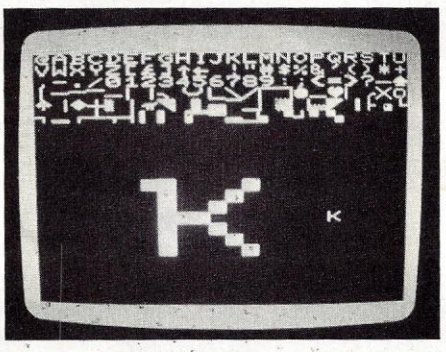
One Step Ahead

347 North Charles Street • Baltimore, Md. 21201 • 301-659-7212

CIRCLE 303 ON READER SERVICE CARD

Eight by Eight Create

Robert Spahitz



8x8 Create is a program designed for a 5K or 8K Commodore Vic-20 computer. The program allows you to examine the make-up of the Pet character set. While a character is being examined, it can be changed into any other character that can be created in an 8 x 8 matrix, hence the title and program name.

The program works as follows: after loading the program and typing RUN, a countdown appears at the top of the screen. While the countdown is progressing, the remainder of the screen becomes a canvas of changing colors and characters. This delay allows the computer to duplicate the character set into RAM so that it can later be changed. Soon, the screen changes to an orange background with a cyan border. The screen clears and the characters you will be working with are put onto the top few lines of the screen.

When a flashing cursor appears in the upper lefthand corner of the screen, you move the cursor (using the normal cursor control keys) to the character you would like to change. When you arrive at the character, press the left arrow key, and an enlarged copy of the character will be displayed. To the left of this appear eight numbers that tell the computer how the character is created. To the right of both of these is a copy of the character in its normal size.

Once again, a flashing cursor will appear, this time in the upper left of the enlarged character. You move the cursor to the square that you want to turn on or off and hit the RVS/ON (9 key) to light it up (yellow) or the RVS/OFF (0 key) to darken it in (red). As you do this, the character on the far right will change accordingly. Note: if a square is orange, it was off when you began; if it is red it was manually turned off; if it is white, it was on when you began; and if it is yellow, it was manually turned on.

To exit the character-change mode, type either x or +. Hitting the plus key (+) will save the character that you created and return you to character-select mode. To examine the character again, or to get the numbers that can create it, hit the left arrow key. To return the character to the way it was when you first ran the program, just type X instead of +. This also returns you the character-select mode.

Once you have created, designed and examined enough characters, you can copy their associated numbers on paper to be used in any programs you make. Some good designs to try include Space Invader characters, animals, and abstract patterns.

The Program

Lines 10 to 170 initialize everything. The memory pointer (locations 55-56) is adjusted so characters being created are not disturbed by program overhead (string storage).

Lines 20 to 70 duplicate the charac-

Listing 1.

```
5 REMSX8 CREATE:BY R SPAHITZ
10 POKE 56,24:POKE52,24:POKE 37879,150:REMSAVE MEMORY;SPEED UP PROGRAM
20 FOR Z=0 TO 1023
30 PRINT CHR$(19)"COUNTDOWN:"INT((1024-Z)/10.24)
40 POKE RND(1)*484+7702,RND(1)*256
50 POKE RND(1)*484+38422,RND(1)*16
60 POKE Z+6144,PEEK(Z+32768)
70 NEXT Z:REMCHARACTERS COPIED
80 POKE 36879,139
90 POKE 36869,254:REMUSE NEW CHARACTERS
100 PRINT CHR$(147)CHR$(17)CHR$(17)CHR$(17)CHR$(17)CHR$(17);
105 PRINT CHR$(17)CHR$(17)CHR$(17)CHR$(17)CHR$(17)
110 FOR Z=0 TO 7
120 POKE 7664+Z,0
130 POKE 7672+Z,255
140 NEXT Z
150 FOR Z=0 TO 127
160 POKE Z+7680,Z
163 POKE Z+7808,190
```

Robert Spahitz, 143 Dewey Ave., Staten Island, NY 10308.

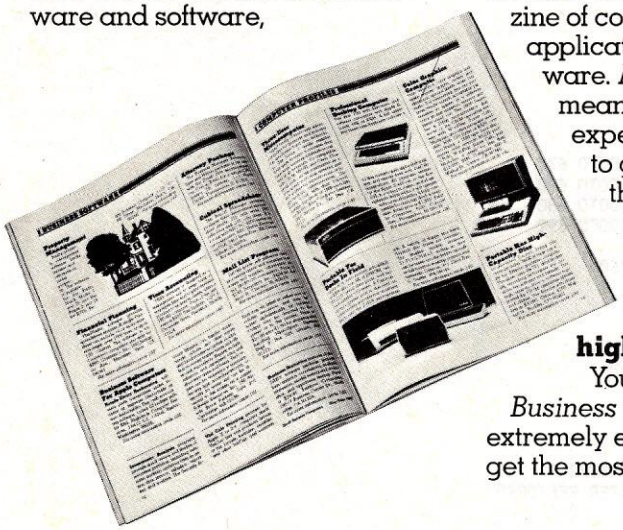
Are you getting the most from your business computer?

Get the best source of information available on microcomputer use: *Small Business Computers*

It pays to consult *Small Business Computers* before you or your company expand your software capabilities, look at new peripherals, or even consider your first office microcomputer. Here's why:

We write only for people who are professionally involved with business microcomputer systems. You won't find any space games or home budget programs in our pages.

Instead, you *will* find feature after feature on business hardware and software,



plus applications you can use right now, and later as your needs grow.

SMALL BUSINESS COMPUTERS critically reviews a variety of software packages for:

- Accounting
- Word processing
- Data base management
- Business planning
- Financial modeling
- Spreadsheet analysis
- File and record handling

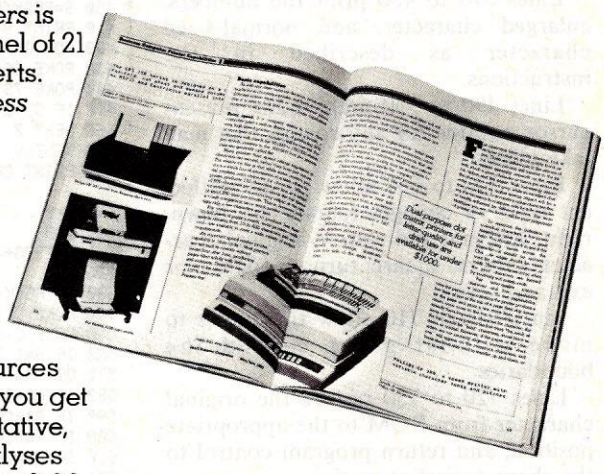
—and much more, from list management to project control.

You'll also evaluate a wide range of hardware and peripherals, including video display terminals, disk storage equipment, printers (dot matrix and daisy wheel) and modems.

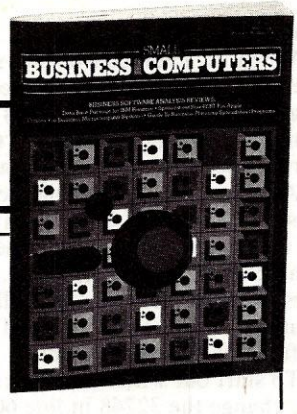
Every evaluation and review in *Small Business Computers* is conducted by our own panel of 21 top computer-science experts. What's more, *Small Business Computers* comes to you from the publishers of *Creative Computing*, the Number One magazine of computer applications and software. All of which means we have the expertise and resources to guarantee that you get the most authoritative, up-to-date analyses and advice available anywhere.

Cost effectiveness: high value plus low price

You can see why *Small Business Computers* will be extremely effective in helping you get the most from a business computer system. Now for the "cost" part: You can subscribe to *Small Business Computers* for as little as $14.97 and save 25% off the full 12-issue subscription rate. Or take 24 or 36 issues and save up to 35%!



Whatever your level of involvement with business microcomputers, it makes sense to get the best source of practical information around. Why not take a moment to fill in and mail the coupon now?



Your subscription to *SMALL BUSINESS COMPUTERS* may be tax deductible. Check with your accountant.

SMALL BUSINESS COMPUTERS CN 1988, Morristown, New Jersey 07960

YES! Enter my subscription to **SMALL BUSINESS COMPUTERS** for:

- ☐ 12 issues at $14.97—I save 25%.
- ☐ 24 issues at $27.97—I save 30%.
- ☐ 36 issues at $38.97—I save 35%.

Savings based on full 12-issue subscription rate of $19.97.
Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue.

CHECK ONE:

- ☐ Payment enclosed.
- ☐ Purchase order enclosed.
- ☐ Bill me later.

8H10

NAME _____ (please print full name)

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

ters from ROM to RAM (line 60) while the colorful display of characters is being POKEd into the screen. Memory location 36879 changes the background/border color while 36869 changes from the normal character set to the programmable character set. After the characters are screen-POKEd (line 120), two special characters are created for later use (lines 140-170).

Lines 180 to 290 allow the cursor to move only within the boundary of the printed characters. If a left-arrow is hit (line 280) a jump is made to the section which handles character-changing.

Lines 300 to 360 test the cursor for out-of-bounds and also adjust the variables that will move the cursor (up, down, right, or left).

Lines 370 to 480 print the numbers, enlarged character, and normal-sized character as described in the instructions.

Lines 490 to 560 prepare the present cursor position for any change that may take place.

Lines 570 to 660 allow for the different types of changes (cursor up, down, right, left; exit and restore original character; turn on square; turn off square; or exit and save).

Lines 670 to 710 allow the cursor to move without going beyond the boundaries.

Lines 720 to 750 restore the original character from ROM to the appropriate position, and return program control to the character-select section.

Lines 760 to 800 turn a position on not only in the enlarged character, but also in the normal-sized character.

Lines 810 to 840 turn a position off in both the enlarged character and the normal-sized character.

Notes

When in character-create mode, hit the left arrow then the + to recreate the character in only two colors (orange/white) or to examine the correct numbers required to create the character.

Avoid changing the number characters (0,1,2,3,4,5,6,7,8,9) unless you have no use for the values left of the enlarged character. If you change them, the numbers printed to the left will also be changed. They can be restored using the X function for each number.

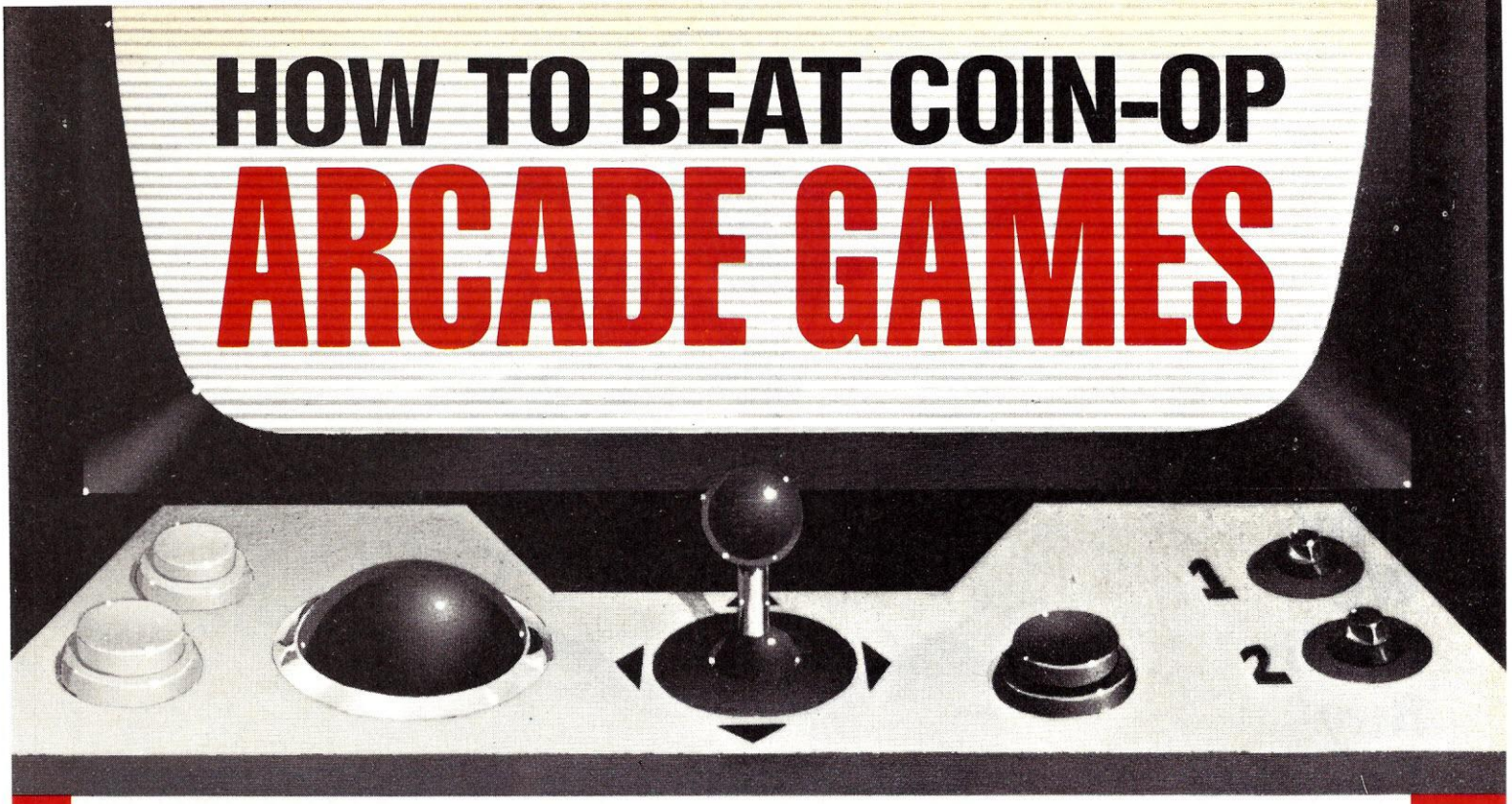
To start out with a different character set, change the 32768 in line 60, and the 28672 in line 730 (4096 less than the number in line 60). I suggest using 33792 for reversed upper case, 34816 for lower case, or 35840 for reversed lower case. Caution: using a different character set may affect the appearance of numbers and thereby make reading the numbers virtually impossible. □

```
166 POKE Z+7936,190
169 POKE Z+8064,190
170 NEXT Z:REMCHARACTERS NOW ON SCREEN
180 P=7680+22*H+V
190 R=PEEK(P)
200 IF Q=191 THEN Q=R:GOTO 220
210 Q=191:REMCURSOR ON OR OFF
220 POKE P,Q
230 GET A$
240 IF A$=CHR$(29) THEN V=V+1:GOTO 300
250 IF A$=CHR$(157)THEN V=V-1:GOTO 300
260 IF A$=CHR$(17) THEN H=H+1:GOTO 320
270 IF A$=CHR$(145)THEN H=H-1:GOTO 320
280 IF A$=CHR$(95) THEN 370
290 GOTO 200
300 IF V<0 THEN V=-21*(H>0): H=H-1
310 IF V>21 THEN V=0: H=H+1
320 IF H<0 THEN H=0
330 IF H>5 THEN H=5
340 IF H=5 AND V>17 THEN V=17
350 POKE P,R
360 GOTO 180
370 POKEP,R:REM CREATE 8X8 WORKBOX
380 POKE 8005,R
390 FOR Y=0 TO 7
400 S=PEEK(P*8-55296+Y)
410 PRINT S CHR$(157)CHR$(32)CHR$(32)
420 FOR Z=7 TO 0 STEP -1
430 POKE 38655+Y*22-Z,1
440 POKE 7935+Y*22-Z,190
450 IF S>=2^Z THEN POKE 7935+Y*22-Z,191: S=S-2^Z
460 NEXT Z
470 NEXT Y
480 PRINT CHR$(145)CHR$(145)CHR$(145)CHR$(145)CHR$(145)CHR$(145)CHR$(145)CHR$(145)CHR$(14
5);
490 A=0
500 B=0
510 C=7928+22*B+A
520 D=0
530 IF PEEK(C)=190 THEN D=1
540 POKE C,190
550 POKE C,191
560 IF D=1 THEN POKE C,190
570 GET A$
580 IF A$=CHR$(29) THEN A=A+1:GOTO 670
590 IF A$=CHR$(157)THEN A=A-1:GOTO 670
600 IF A$=CHR$(17) THEN B=B+1:GOTO 690
610 IF A$=CHR$(145)THEN B=B-1:GOTO 690
620 IF A$="X" THEN 720
630 IF A$="9" OR A$=")" THEN 760
640 IF A$="0" THEN 810
650 IF A$="+" THEN 200
660 GOTO 540
670 IF A<0 THEN A=-7*(B>0): B=B-1
680 IF A>7 THEN A=-7*(B=7): B=B+1
690 IF B<0 THEN B=0
700 IF B>7 THEN B=7
710 GOTO 510
720 FOR Y=0 TO 7
730 POKE P*8-55296+Y,PEEK(P*8-28672+Y)
740 NEXT Y:REM ORIGINAL CHARACTER RESTORED
750 GOTO 200
760 POKE C,191:REM SPOT ON
770 POKE C+30720,7
780 D=0
790 POKE 6144+H*176+V*8+B,PEEK(6144+H*176+V*8+B) OR 2^(7-A)
800 GOTO 540
810 POKE C,190:REM SPOT OFF
820 POKE C+30720,2
830 POKE 6144+H*176+V*8+B,PEEK(6144+H*176+V*8+B) AND 255-2^(7-A)
840 GOTO 540
```

Table 1.

CHR$ (x)	can be replaced by	found on line(s)
x=19	home key	30
x=147	clear key	100
x=17	cursor down	100, 105, 260, 600
x=29	cursor right	240, 580
x=157	cursor left	250, 410, 590
x=145	cursor up	270, 480, 610
x=95	up arrow (↑)	280
x=32	space ( )	410

HOW TO BEAT COIN-OP ARCADE GAMES

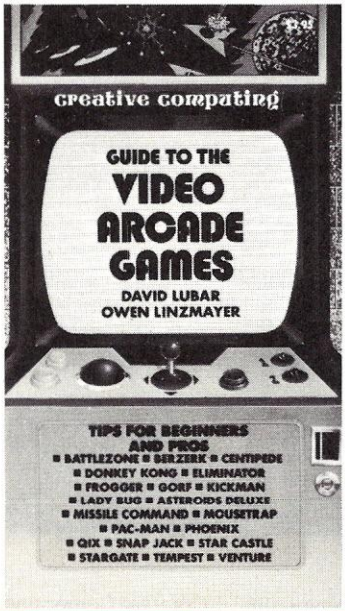


GET THE NEW *CREATIVE COMPUTING GUIDE TO THE VIDEO ARCADE GAMES!*

Here's the book coin-op game fanatics have been waiting for! The CREATIVE COMPUTING GUIDE TO THE VIDEO ARCADE GAMES is an all-new, field-tested manual filled with savvy advice and sound tips on how to get the most from all those quarters!

Authors David Lubar and Owen Linzmayer spent thousands of hours playing games, taking notes, and finding the most effective strategies for winning. The result is a player's guide to the 20 most popular games, from Donkey Kong and Pac-Man to Mousetrap and Centipede.

The GUIDE TO THE VIDEO ARCADE GAMES helps beginners avoid being wiped out in seconds, find places to hide, learn how to shoot and move. For advanced players, there's a wealth of hard-won intelligence on exploiting programming oversights to prolong the action and rack up record scores. The detailed illustrations—at least two for each game—will help readers on every level to better understand the action and tactics described.



Save money on practice sessions and be the envy of your fellow gameplayers—with the GUIDE TO THE VIDEO ARCADE GAMES. Order your copy today!

ONLY $3.95!

$4\frac{3}{16}'' \times 6\frac{7}{8}''$
Softcover, 112 pages.

For faster service,
PHONE TOLL FREE:
800-631-8112
(In NJ call 201-540-0445)

In the GUIDE TO THE VIDEO ARCADE GAMES, you'll learn about:

- **Collisions,** and how various games deal with them. The differences are important to you.
- **Bonuses,** and why you should be cautious about going for some of them. Many bonuses are real benefits, but others are decoys.
- **Rates of fire,** and how they vary from game to game.
- **Wraparound,** and how to judge exactly where an object will reappear on the screen.
- **Horizontal and vertical motion,** and when to take advantage of diagonal movement.
- **Distractions** and why they are dangerous.
- **Goals,** and why it's important to know what they are for each game.

creative computing Dept. HA6F
39 East Hanover Avenue, Morris Plains, NJ 07950

Send me _____ copies of the GUIDE TO THE VIDEO ARCADE GAMES, at $3.95, plus $1 postage and handling,* each. (#14A)

☐ PAYMENT ENCLOSED $_____ (NJ residents add 5% sales tax.)

*All foreign orders (except Canada and Mexico) add $3 to postage and handling shown. Shipped air mail only.

☐ CHARGE MY:
☐ American Express ☐ MasterCard ☐ Visa
(Charge and phone orders: $10 minimum.)

Card No._____ Exp. Date_____

Signature_____

Mr./Mrs./Ms._____
(please print full name)

Address_____ Apt._____

City_____ State_____ Zip_____

Institutions only—purchase orders under $50 not accepted.

Why We Really Buy Creative Computing

Fred Gunther

Isn't it about time that we let the editors and managers know why we really buy Creative Computing? The editors think that we put our money down on the counter because of the exciting layouts and the stimulating editorials. The feature writers think that we subscribe because we don't want to miss an installment on how "My Personal Computer Lets Me Dig Ditches for Fun and Profit." The advertising staff and the advertisers think that we rob the kids' piggy banks each month to learn what the new hardware and software might be.

While there are elements of truth in all these theories, the real reason we buy and read this magazine is to find programming challenges. Has someone published a new game; after I type it in, what can I do to make it work "better"?

Has someone published a program in a language different than the one(s) my computer uses; how can I make the translation? Has someone advertised a new gizmo or widget; how can I produce a super-gizmo, or a widget simulator?

Let's take a case in point. We have all seen the Squiral advertisement for hi-res drawing on the Apple II. The Logo people have used it to prove how easy it

Fred J. Gunther, 9464 Wandering Way, Columbia, MD 21045.

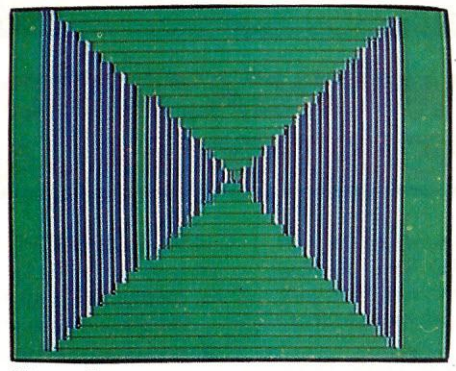


Figure 5.

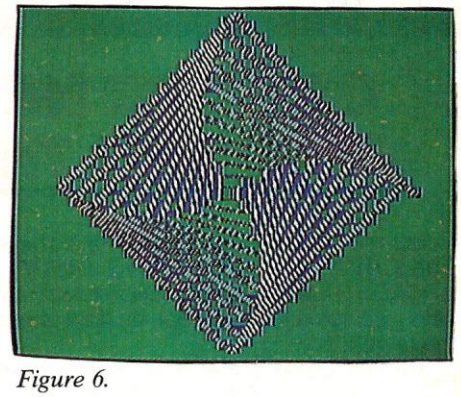


Figure 6.

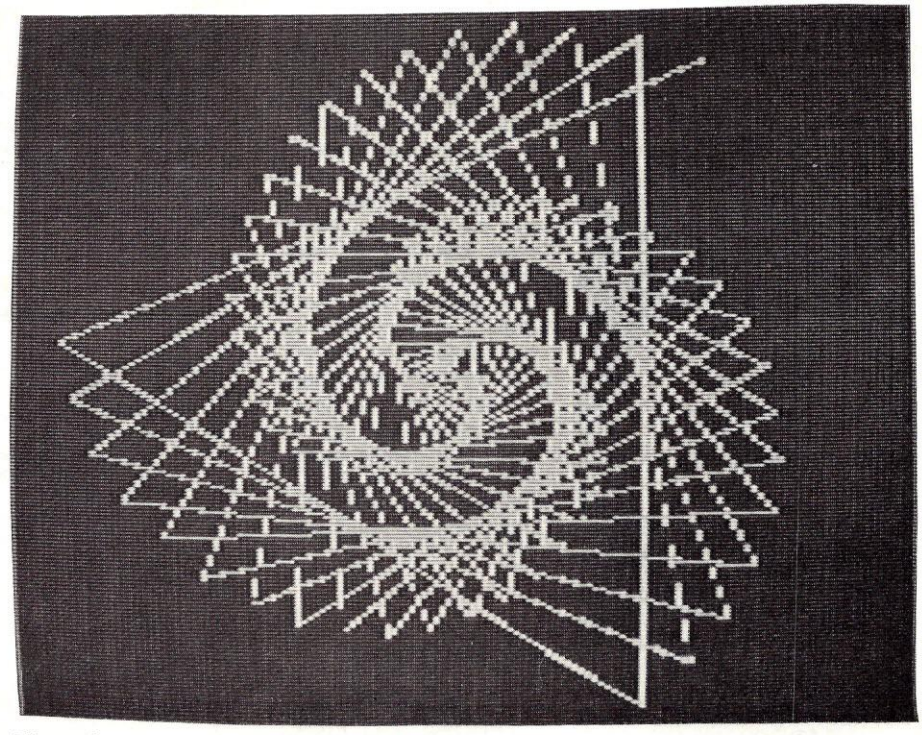


Figure 1.

is to produce graphic designs.

What can be done in one language can be done in another. The challenge is to actually do it. My answer to the Squiral challenge is a program I call Basic Squiral (Listing 1). Written in Applesoft Basic, it will produce many different figures.

Like the Logo version, angle values of 59, 60, 61, or 89, 90, 91, or 118, 120, 123, etc. will produce interesting designs (Figures 1-4). It is even possible to add a little more code, so that the designs are plotted in color, on a color background (Figures 5 and 6).

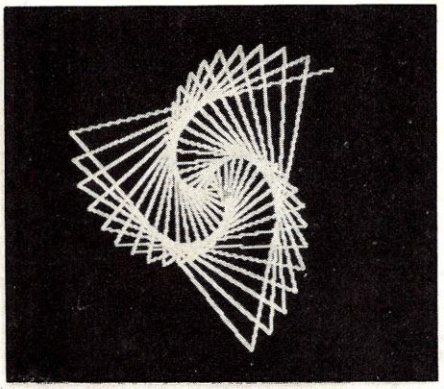


Figure 2.

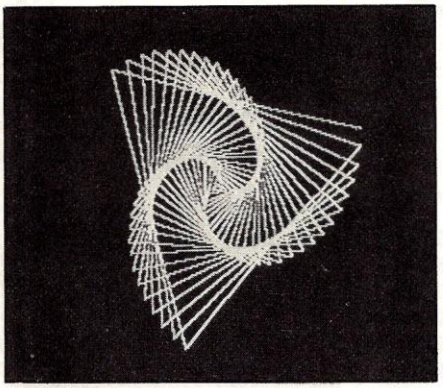


Figure 3.

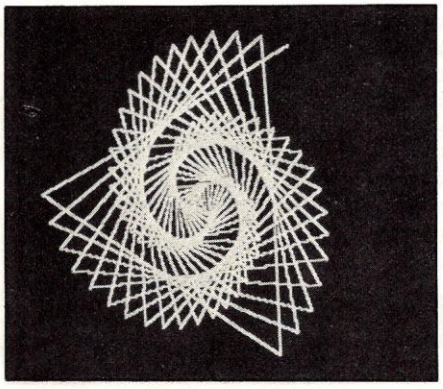


Figure 4.

Editor's Note: Taking the challenge a step farther, we have translated Basic Squiral from Applesoft to TRS-80 Color and Atari Basic. □

Listing 1. Applesoft Basic Squiral.

```
10  TEXT : HOME : VTAB 5: PRINT "    *****      BASIC
      SQUIRAL      *****"
20  LET PI = 3.14159:W = PI / 180.: VTAB 15
30  HTAB 12: PRINT "SUPPLY VARIABLES": PRINT : PRINT "
      -- DISTANCE, ANGLE,
    INCREMENT -- ": PRINT : INPUT D,ANG,I
40  HGR2 :X = 140:Y = 96: HCOLOR= 3:A = ANG
50  LET XN = X + D *  COS (W * A):YN = Y + D *  SIN
      (W * A)
60  HPLOT X,Y TO XN,YN
70  LET D = D + I
80  IF D > 200 THEN  STOP
90  LET A = A + ANG
100  LET X = XN:Y = YN
130  GOTO 50
```

Sample run for Applesoft Squiral.

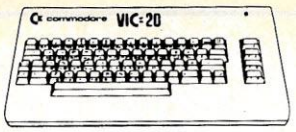
```
]RUN
   *****      BASIC SQUIRAL      *****
            SUPPLY VARIABLES

 -- DISTANCE, ANGLE, INCREMENT --

?1,123,3
```

Listing 2. TRS-80 Color Basic Squiral.

```
10 CLS : PRINT "BASIC SQUIRAL"
20 PRINT : PRINT "SUPPLY VARIABLES:"
30 PRINT "--DISTANCE, ANGLE, INCREMENT--"
40 INPUT D, ANG, I
50 LET PI = 3.14159 : W = PI/180
60 PMODE 4,1 : PCLS : SCREEN 1,1
70 X = 136 : Y= 92 : A = ANG
80 XN = X + D*COS(W*A)
90 YN = Y + D*SIN(W*A)
100 LINE (X,Y)-(XN,YN), PSET
110 IF D>150 THEN 160
120 A = A + ANG
130 X = XN
140 Y = YN
150 GOTO 80
160 A$ = INKEY$ : IF A$<>""THEN RUN
170 GOTO 160
```

Listing 3. Atari Basic Squiral.

```
10 DIM A$(1):REM ATARI TRANSALATION
20 GRAPHICS 8:COLOR 1:TRAP 140
30 PRINT "------BASIC SQUIRALS------- "
40 PI=3.14159:W=PI/180
50 PRINT "SUPPLY VARIABLES:":PRINT "DISTANCE, ANGLE, INCREMENT"
60 INPUT D,ANG,I
70 X=140:Y=96:A=ANG:PLOT X,Y
80 XN=X+D*COS(W*A):YN=Y+D*SIN(W*A)
90 DRAWTO XN,YN:D=D+I
100 IF D>200 THEN STOP
110 A=A+ANG:X=XN:Y=YN
120 GOTO 80
130 GOTO 75
140 PRINT "WANT TO GO AGAIN";:INPUT A$:IF A$="Y" THEN GOTO 20
```



commodore

VIC 20 . . . . $179

VIC 1530 Datasette	$ 59
VIC 1540 Disk Drive	$299
VIC 1525 Graphics Printer	$309
VIC 1210 3K Memory Expander	$ 34
VIC 1110 8K Memory Expander	$ 52
VIC 1111 16K Memory Expander	$ 92
VIC 1011 RS 232 Terminal Interface	$ 43
VIC 1211 Super Expander	$ 52
VIC 1212 Programmers Aid Cartridge	$ 45
VIC 1213 Vicmon Machine Language Monitor	$ 45
VL 102 Introduction to Basic Programming	$ 21
VT 106A Recreation Pack	$ 45
VT 107A Home Calculation Pack	$ 45
VT 164 Programmable Character Set	$ 12
VIC 1600 Vicmodem	$ 89
VIC 1311 Joystick	$ 8
VIC 1312 Game Paddles	$ 16
VM Programmers Reference Guide	$ 14

VIC Software

Avenger	$ 23
Superslot	$ 23
Super Alien	$ 23
Jupiter Lander	$ 23
Draw Poker	$ 23
Midnight Drive	$ 23
Radar Rat Race	$ 23
Raid on Fort Knox	$ 23
Sargon II Chess	$ 29
Super Smash	$ 23
Cosmic Cruncher	$ 23
Gorf	$ 29
Omega Race	$ 29
Money Wars	$ 23
Menagerie	$ 23
Cosmic Jailbreak	$ 23
Clowns	$ 23
Garden Wars	$ 23
Sea Wolf	$ 23
Adventureland	$ 29
Pirate Cove	$ 29
Mission Impossible	$ 29
The Count	$ 29
Voodoo Castle	$ 29
The Sky is Falling	$ 23
Mole Attack	$ 23
Bingo Speed Math	$ 23
Home Babysitter	$ 23
Visible Solar System	$ 23
Personal Finance	$ 29

United Microware

Spiders of Mars	$ 34
Meteor Run	$ 34
Amok (C)	$ 17
Alien Blitz (C)	$ 17
Skymath	$ 12
Space division	$ 12
Super Hangman	$ 14
The Alien	$ 17
3D Maze	$ 12
Kosmic Kamikaze	$ 17
Sub Chase	$ 17
Amok (CT)	$ 27
Renaissance	$ 34
Alien Blitz (CT)	$ 27
Cloud Burst	$ 27
Satellites and Meteorites	$ 34
Outworld	$ 34

Creative Software

Black Hole	$ 36
Trashman	$ 36
Astroblitz	$ 36
City Bomber & Minefield	$ 20
Apple Panic	$ 36
Choplifter	$ 36
Serpentine	$ 36

American Peripherals

Snakman	$ 18
Astrobase-2001	$ 10
Victoroids	$ 25
Intruder-Scramble	$ 18
Mobile Attack	$ 25
Crack	$ 25
Guardian	$ 25
Quark	$ 25

FRIENDLY SERVICE

APPLE SOFTWARE

NEW

Lazer Maze	$ 20	Bumble Games	$ 39
Federation	$ 20	Bumble Plot	$ 39
Shootout at the O.K. Galaxy	$ 19	Gertrude's Secrets	$ 49
Sea Fox	$ 20	Gertrude's Puzzles	$ 49
Space Kadet	$ 24	Rocky's Boots	$ 49
Mars Cars	$ 20	Pest Patrol	$ 20
Money Muncher	$ 20	Lunar Leeper	$ 20
Vortex	$ 20	Cannonball Blitz	$ 23
Pandora's Box	$ 20	Laffpak	$ 23
High Orbit	$ 20	Frazzle	$ 17
Kamikaze	$ 23	Firebug	$ 17
Shuttle Intercept	$ 23	S.E.U.I.S.	$ 27
Free Fall	$ 20	Snooper Troops #1	$ 30
Wayout	$ 27	Snooper Troops #2	$ 30
The Blade of Blackpool	$ 27	Story Machine	$ 23
Ali Baba & the Forty Thieves	$ 22	Face Maker	$ 23
Guadacanal	$ 39	Lazer Silk	$ 20
The Cosmic Balance	$ 27	Zenith	$ 23
Galactic Gladiators	$ 27	Phaser Fire	$ 20
Juggles Rainbow	$ 30	Prisoner II	$ 22

COMPUTER OUTLET

*** SPECIALS OF THE MONTH ***

Slagh 24K Memory Board — VIC 20	**$ 145**
Slagh 6-Slot Expansion Mother Board	**$ 119**
Smartmodem II	**$ 269**
Amdex Color II Monitor	**$ 759**
NEC 3510 Printer	**$1699**
Microline 84 Printer	**$1089**
The Grappler Plus	**$ 139**
Novation Apple Cat II Modem	**$ 329**
Verbatim Disks (Box)	**$ 27**
Anadex Printer	**$1289**
Hayes Smartmodem 1200	**$ 539**
Hayes Chronograph	**$ 199**
System Saver Fan	**$ 65**
The Joyport	**$ 53**
Wico Trackball	**$ 49**
Wico Joystick	**$ 23**
Wico Joystick Deluxe	**$ 26**
Wico Famous Red Ball Joystick	**$ 24**

Computer Outlet

Park Place — Upper Level
1095 E. Twain — (702) 796-0296
Las Vegas, Nevada 89109

Call Toll Free **800-634-6766**
We accept Major Credit Cards
Mon.-Fri. 8 A.M.-6 P.M.
Sat. 9 A.M.-5 P.M.

APPLE SPECIALS

Entertainment

Bez-Wars	$ 19
Bez-Man	$ 15
Baseball	$ 20
Peeping Tom	$ 23
Fly Wars	$ 20
Kabul Spy	$ 23
The Gauntlet	$ 24
Sherwood Forest	$ 23
The Queen of Phobos	$ 23
Zero Gravity Pinball	$ 20
Amoeba Man	$ 24
Marauder	$ 24
Knight of Diamonds	$ 24
Cytron Masters	$ 27
Star Blazer	$ 22
Swashbuckler	$ 23
Twerps	$ 20
Minotaur	$ 23
Lemmings	$ 20
Bandits	$ 23
Dueling Digits	$ 20
Cyclod	$ 20
Frogger	$ 23
Choplifter	$ 23
Serpentine	$ 23
David's Midnight Magic	$ 23
Escape (A2-SG1)	$ 22
Congo	$ 23
Goldrush	$ 23
Pig Pen	$ 20
Tunnel Terror	$ 20
Threshold	$ 27
Time Zone	$ 65
Ulysses & The Golden Fleece	$ 23
Gorgon	$ 27
Ceiling Zero	$ 20
Raster Blaster	$ 20

Business

Screenwriter II	$ 89
Visicalc 3.3	$ 179
The Word Handler	$ 129
Magic Window	$ 65
Magic Mailer	$ 45
Magic Words	$ 45
Real Estate Analyzer II	$ 125
Supercalc	$ 185
PFS: Report (New)	$ 65
The General Manager	$ 97
D.B. Master	$ 159
Pascal Programmer	$ 89
Pie Writer	$ 95
Wordstar	$ 219
Datafax	$ 129
Datalink	$ 65
The Home Accountant	$ 52

Peripherals

Micromodem II	$ 269
Novation Apple-Cat II Modem	$ 319
The Joyport	$ 53
The Grappler Plus	$ 129
Game Paddles	$ 28
Ramplus-32K	$ 159
Card Reader	$1219
The Clock	$ 229
Rana Elite One Disk Drive	$ 359
System Saver	$ 65
NEC 3510 Printer	$1699
NEC 12" Green Screen Monitor	$ 169
Microline 84 Printer	$1089
Amdek Color II Monitor	$ 759
Versa Writer Graphics Tablet	$ 239
Ramcard	$ 139
Softcard	$ 269

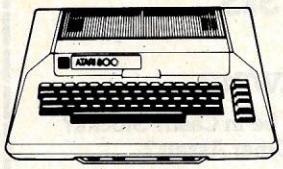
The Computer Outlet is an associate of The Computer Learning Center For Children. We are experts in educational technology and can customize educational software curriculums for school districts, individual schools, or for the child at home. Please contact us about your software and equipment requirements and feel free to stop by our school in Las Vegas.

We have one of the world's largest educational software inventories featuring our own Computer Learning Center software.

Ten Little Robots (ATARI)	$12.95
Pre-School Math (ATARI)	$19.95

ATARI ™

NEW LOWER PRICES



800 48K . . $619

400 16K . . $259

410 Recorder	$ 75
810 Disk Drive	$419
825 Printer	$579
830 Modem	$155
850 Interface	$165
481 Entertainer	$ 79
482 Educator	$119
483 Programmer	$ 55
484 Communicator	$299
853 16K Ram	$ 75
The Bookkeeper Kit	$169

ATARI Software

CX4104 Mailing List	$ 19
CX404 Word Processor	$115
CXL4007 Music Composer	$ 45
Programming 2 & 3	$ 22
Conversational Languages	$ 45
CX4018 Pilot	$ 59
CX405 Pilot	$ 99
CXL4003 Assembler Editor	$ 45
CX8126 Microsoft Basic	$ 67
CXL4022 Pac-Man	$ 33
CX8130 Caverns of Mars	$ 29
CXL4020 Centipede	$ 33
CXL4006 Super Breakout	$ 28
CXL4008 Space Invaders	$ 28
CXL4009 Computer Chess	$ 28
CXL4011 Star Raiders	$ 33
CXL4012 Missile Command	$ 28
CXL4013 Asteroids	$ 28
The Bookeeper	$105
Home Filing Manager	$ 37
Atari Speed Reading	$ 54
My First Alphabet	$ 26

Business & Utilities

Visicalc	$169
Mail Merge	$ 20
Data Perfect	$ 75
Letter Perfect	$105
Text Wizard	$ 65
Disk Detective	$ 20
Datasm 65 2.0	$ 59
File-Manager 800 +	$ 65
Syn Assembler	$ 34
Page 6	$ 20
Atari World	$ 39
K-Dos	$ 59
Micropainter	$ 23
Color Print	$ 27
Lisp Interpreter	$ 79
Bishops Square	$ 20
Graphic Master	$ 27
Graphic Generator	$ 17
Basic Compiler	$ 65

Programming Techniques

Display Lists	$ 17
Horiz/Vert Scroll	$ 17
Page Flipping	$ 17
Basics of Animation	$ 17
Player Missile Graphics	$ 24
Sound	$ 17
Data Files	$ 24

For Fast Delivery, send certified or cashier checks, money orders, or direct bank wire transfers. Personal checks allow 2 to 3 weeks to clear. Prices reflect a cash discount only and are subject to change. Shipping—Software ($2.00 Minimum). Hardware—call. Foreign inquiries invited — add 15% for shipping. Nevada residents add sales tax.

TOP SELLERS

Atari

Temple of Apshai	$ 27	Rear Guard	$ 17
Raster Blaster	$ 20	Lunar Lander	$ 17
Apple Panic	$ 20	War	$ 17
Crossfire	$ 20	Star Warrior	$ 27
Threshold	$ 27	Invasion Orion	$ 17
Mousekattack	$ 23	Dragon's Eye	$ 20
Krazy Shootout	$ 34	Crush, Crumble & Chomp	$ 20
Deadline	$ 34	Jawbreaker	$ 20
Tumble Bugs	$ 20	Pathfinder	$ 23
Pool 1.5	$ 23	Zork I	$ 27
Crypts of Terror	$ 23	Zork II	$ 27
Richochet	$ 15	Action Quest	$ 20
Empire of the Overmind	$ 23	Softporn Adventure	$ 20
Tanktics	$ 20	Deluxe Invaders	$ 23
Match Racers	$ 20	Protector	$ 23
Wiz & Princess	$ 22	Dodge Racer	$ 23
Mission: Asteroid	$ 17	Chicken	$ 23
Ali Baba & the Forty Thieves	$ 22	Nautilus	$ 23
The Shattered Alliance	$ 27	Alien Hell	$ 15
Bug Attack	$ 20	Mar Tesoro	$ 17
Canyon Climber	$ 20	Galactic Chase	$ 20
Shooting Arcade	$ 20	Alien Swarm	$ 23
Pacific Coast Highway	$ 20	Intruder	$ 23
Clowns & Balloons	$ 20	Lords of Karma	$ 15
Ghost Hunter	$ 23	B-1 Nuclear Bomber	$ 12
Preppie	$ 20	Rescue at Rigel	$ 20

*** SPECIALS OF THE MONTH ***

ELEPHANT DISKS (BOX)	$ 22
HAYES SMARTMODEM	$229
FRIENDLY TERMINAL SOFTWARE PACKAGE (ATARI)	$ 39
MOSAIC 32K RAM	$ 99
RAMDISK (128K)	$429
AMDEK COLOR I MONITOR	$329
PERCOM DOUBLE DENSITY DRIVE	$639
NEC 8023A PRINTER	$479
K-DOS	$ 59
OS/A +	$ 59
BASIC A +	$ 59
FLIP N' SORT DISKETTE BOX (Holds 50 Diskettes)	$ 21
FLIP-SORT CARTRIDGE BOX (Holds 10 Atari Computer Cartridges)	$ 21
AXIOM GP-100 GRAPHICS PRINTER	$299
AXIOM IMP-4 GRAPHICS PRINTER	$499

Computer Outlet

Park Place — Upper Level
1095 E. Twain — (702) 796-0296
Las Vegas, Nevada 89109

Call Toll Free **800-634-6766**

We accept Major Credit Cards
Mon.-Fri. 8 A.M.-6 P.M.
Sat. 9 A.M.-5 P.M.

CIRCLE 142 ON READER SERVICE CARD

NEW

Atari

Atari Program Exchange

Salmon Run	$ 19
Galahad and The Holy Grail	$ 19
Seven Card Stud	$ 13
Advanced Music System	$ 23
Elementary Biology	$ 25
Frogmaster	$ 19
Checker King	$ 19

Automated Simulations

Upper Reaches of Apshai	$ 15
Curse of Ra	$ 15
King Arthur's Heir	$ 20
Escape from Vulcan's Isle	$ 20
Crypt of the Undead	$ 20
The Nightmare	$ 20

Broderbund

David's Midnight Magic	$ 23
Track Attack	$ 20
Star Blazer	$ 22
Choplifter	$ 23
Deadly Secrets	$ 23
Stellar Shuttle	$ 20

Datasoft

Spell Wizard	$ 53
Sands of Egypt	$ 27
O'Riley's Mine	$ 23
Rosen's Brigade	$ 23
Fathoms Forty	$ 23

Gebelli

Doctor Goodcode's Cavern	$ 20
Firebird	$ 34
Embargo	$ 34

Innovative Design

Pool 400	$ 27
Speedway Blast	$ 27

JV Software

Ghost Encounters	$ 20

K-Byte

K-razy Kritters	$ 34
K-Star Patrol	$ 34
K-Razy Antiks	$ 34

L & S Computerware

Crossword Magic	$ 34

Lightning Software

Master Type	$ 27

On-Line

Frogger	$ 23
Ulysses and The Golden Fleece	$ 23
Ultima I	$ 27
Ultima II	$ 39

Roklan Corp.

Gorf (d)	$ 27
Wizard of Wor (d)	$ 27
Anti Sub Patrol (d)	$ 20
Gorf (CT)	$ 30
Wizard of Wor (CT)	$ 30
Anti Sub Patrol (C)	$ 15

Sentient

Cyborg	$ 23
Gold Rush	$ 23

Sirius

Space Eggs	$ 20
Sneakers	$ 20
Cyclod	$ 20
Snake Byte	$ 20
Bandits	$ 23
Way Out	$ 27
Fast Eddy	$ 20
Deadly Duck	$ 20
World War I	$ 23
Beanie Bopper	$ 23

Strategic Simulations

Battle of Shiloh	$ 27
Tigers in the Snow	$ 27
The Cosmic Balance	$ 27

Synapse

Slime	$ 23
Shamus	$ 23
Apocalypse	$ 23
Raptillian	$ 23
Picknick Paranoia	$ 23
Claim Jumper	$ 23

56 page FREE catalog

Business Forms and Supplies for MICRO Computers

Save money. Your firm name and address printed on standardized, continuous checks, invoices, statements, letterheads and labels. Designed to work with programs from over 200 software sources . . . or program to our attractive forms yourself with guides provided.

Full color catalog also has stock tab paper, envelopes, diskettes, many other supplies and accessories.

- **Quality products at low prices**
- **No "handling charges" or hidden extras**
- **Available in small quantities**
- **Money-Back Guarantee**

Fast service . . . buy direct by mail or
PHONE TOLL FREE
1 + 800-225-9550
(Mass. residents 1 + 800-922-8560)
8:00 A.M. to 5:00 P.M., ET

NAME PHONE

COMPANY

STREET

CITY, STATE and ZIP

Required to help us send you correct information:

SOFTWARE BRAND PACKAGE# ☐ Do own programming.

COMPUTER MAKE MODEL# ☐ Have not purchased yet.

YOUR LINE OF BUSINESS Number of employees.

14103

Nebs Computer Forms

NEBS

12 South Street, Townsend, Massachusetts 01469
A division of New England Business Service, Inc.

CIRCLE 216 ON READER SERVICE CARD

INVESTMENT ANALYSIS

New Software

How do you know when to be in Cash? Stocks? Mutual Funds? or Other Assets?

INVESTOR'S PATHWAY™ uses our sophisticated analysis to give buy and sell signals and selects individual stocks, precious metals, mutual funds or any other assets that have historic prices.
Price with manual **$179.00**

MARKET PATHWAY™ is an easy to use technical trading discipline which tells when the Dow, NYSE or any selected index turns bullish or bearish **$59.00**

Order now and purchase both for $199.00

Both programs are available for Apple II+, 48K RAM, APPLESOFT, 1 disk drive, DOS 3.3.

Send $3 (credited to your first purchase) for more information and sample outputs.

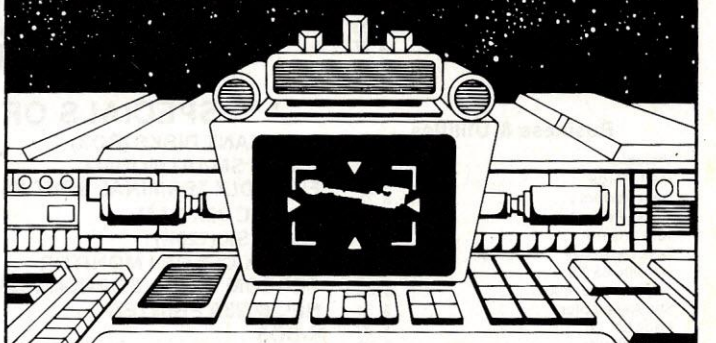
PATHWAY™ SOFTWARE
DIVISION OF TOWN PROPERTIES, INC.

Post Office Box 2006
Dept. CC301
Traverse City, MI 49685

Apple and Applesoft are registered trademarks of Apple Computer Inc.

CIRCLE 230 ON READER SERVICE CARD

STARSHIP COMMANDER



Take Command!

- 41 Major Commands to manage the crew, maintain power, maneuver, make repairs, fire weapons, communicate.
- 30 Hi-Resolution color displays, including 3-D.
- 7 Stations – Engineering, Science, Weapons, Defense, Communications, Life Support, Navigation.
- 120 Crew Members and Officers, assignable by name.
- Send messages to the enemy – and receive messages back.
- Manual, Semi, or Automatic Systems Control.
- Current game can be saved.

48K Apple II DOS 3.3 with paddles. On sale at your local computer store or send check for $29.95 to:

VOYAGER SOFTWARE · P.O. BOX 1126 · BURLINGAME, CA 94010

Allow 21 days for delivery California residents add 6½% sales tax.

CIRCLE 285 ON READER SERVICE CARD

Brain Warp

Dub Scroggin

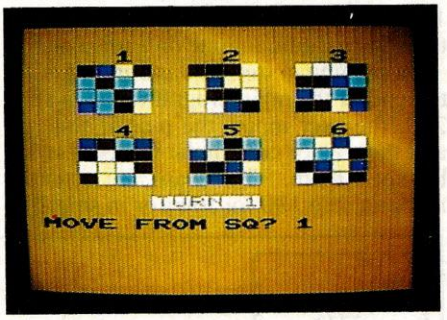
Brain Warp is a puzzle program designed to make use of the sound and color capabilities of the Commodore Vic-20. The program fits in standard Vic memory. The object is to manipulate the rows and columns of six squares and make order out of chaos. Six squares of scattered color are rearranged into six solid-colored squares. Sounds easy, huh? Try it.

There are thousands of paths to a solution and a total of 720 possible solutions. Most solutions will average around 60 moves, though it is possible to reach one in 30 or fewer moves. The more you practice, the better you'll get and the fewer moves you'll require.

Moves are made by specifying a pair of numbered squares and then designating a particular row or column. This row or column is then swapped between the two squares. For example, if squares two and five are specified and the designated row or column is row three, then row three of square two will swap places with row three of square five. This move is depicted in Figure 1.

The puzzle is designed around a three-dimensional array Z(S,R,C), where S is the square number and R and C are the row and column numbers, respectively. There are six squares consisting of four rows and four columns each, hence a total of 96 block positions. Z(2,2,3) designates the third column of the second row, while Z(2,3,4) designates the fourth column of the third row. Both of these squares, as we can see from the first number, are in square two. Rows are horizontal and numbered from top to bottom, while columns are vertical and numbered from left to right. See Figure 2 for an example of the block positions of square two.

Square three would be identical to this, but in each case the first number would be three. Of course, the contents, colors and screen locations would also be different.



By holding the square and row numbers constant and varying the column number from one to four, it is possible to isolate a row of a particular square and manipulate it. Holding the square and column numbers constant and varying the row number from one to four, we get the contents of a particular column. Again, Figure 2 should help make this clear.

Initially, the program reads a number into each of the 96 block positions. This number is the color code for the particular location and determines the color of the block. The colors used are black, white, red, cyan, blue, and yellow, and the codes are those found in the Vic manual.

Moving a color code to a different position in the array causes the block at that position to change color. Movements, of course, are made a row or column at a time, rather than by individual block.

Step 20 of the program reserves 96 blocks in memory for the contents of the three-dimensional array and an additional six on which the screen location of each square is based. Step 30 reads the values into these two arrays. K is the column number, J is the row number and I is the square number.

Step 40 puts the square numbers on the screen and marks the start of the main

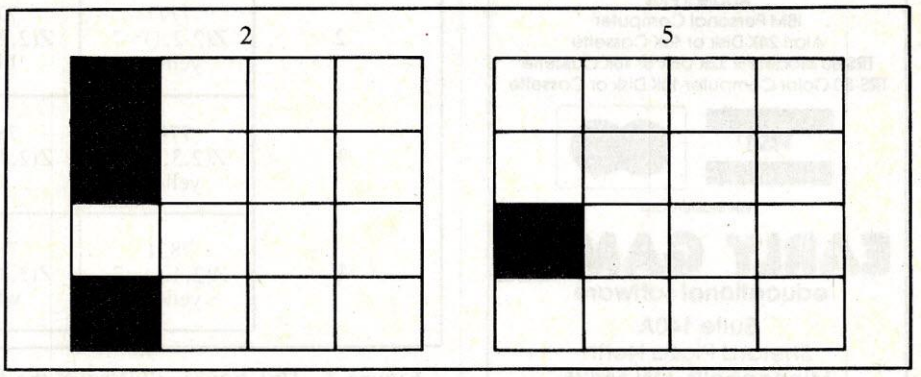


Figure 1. In this example, swapping row three between squares two and five will produce a column of solid black which can then be joined with other such columns to form a black square.

Dub Scroggin, 404 Woodrow St., Ft. Walton Beach, FL.

EARLY GAMES

FOR YOUNG CHILDREN

Nine educational and entertaining games controlled by a single program. Even very young children can select a game, play it, and select a different game...**ALL BY THEMSELVES!**

- **PICTURE MENU GIVES CHILDREN CONTROL**
- **MATCH NUMBERS AND LETTERS**
- **COUNT COLORFUL BLOCKS**
- **ADD AND SUBTRACT STACKS OF BLOCKS**
- **LEARN THE ALPHABET**
- **PRACTICE SPELLING NAMES**
- **COMPARE SHAPES**
- **DRAW AND SAVE COLORFUL PICTURES**

The large numbers and letters fill the screen with color. Children enter single key stroke responses and get immediate visual and musical feedback. Hints are provided when appropriate. Beyond just teaching children basic skills, **EARLY GAMES** makes them feel comfortable as they control the computer. Designed for children ages 2½ to 6 years old.

EARLY GAMES offers the child a diverse selection of activities which stimulate the process of problem solving as well as foster individual creativity.

Pamela Bach, Director
Youth World Day Care Center

I took **EARLY GAMES** home for my kids and they really liked it! It held their attention and they learned from it!

Jeanette Fritze
Computer Saleswoman

EARLY GAMES can help children learn new concepts, information, and skills and also introduce them to the joys and benefits of home computers.

Peter Clark, faculty
Institute of Child Development
University of Minnesota

All nine games for $29.95
(Minnesota residents add 5% sales tax)

Apple II Plus
IBM Personal Computer
Atari 24K Disk or 16K Cassette
TRS-80 Model I/III 32K Disk or 16K Cassette
TRS-80 Color Computer 16K Disk or Cassette

VISA MasterCard

VISA/MasterCard

EARLY GAMES
educational software
Suite 140A
Shelard Plaza North
Minneapolis, MN 55426
1-800-328-1223
Minnesota residents call:
612-544-4720

CIRCLE 193 ON READER SERVICE CARD

program loop. Steps 50-70 translate the current contents of array Z into the six squares of sixteen blocks each on the screen, as well as providing the double-voiced sound effect.

In step 60 LO(I) is the screen position to the left and above where square I will be placed. Multiplying J by 22 moves down one space. Then, as K goes from 1 to 4, the top row of the square is set in place. When J then changes to 2, we drop to the second row and place its four columns, and so on.

POKEing 207 into each location gives each square its border and sets off the colors. In the latter half of step 60 SC is used to shift to the screen color coding and Z(I,J,K) determines the color of the block just positioned.

Steps 80-100 check for a correct solution by comparing the color of the first block (row one, column one) of each square to each of the other blocks. You may notice a slight delay here, especially as the puzzle nears solution. If a mismatch is found, the triple loop is terminated and the program continues. If no mismatches are found, then the puzzle is solved and step 110 initiates the end-of-game routine starting at line 3000.

To test the end-of-game routine you may temporarily change 120 in line 90 to 110. The program will then go directly to the end-of-game routine on a mismatch.

Beginning in step 130 and ending with the end of the main program loop in step 210, the user inputs the pair of squares and the row or column he wants to swap between them. The swaps are actually made in step 180 for rows or in step 200 for columns.

To swap rows, I hold the square and row number constant and vary the column number using M. F and T represent the input "from" and "to" squares, respectively, while R is the input row number to be swapped. The contents of Z(F,R,M) are temporarily placed in HO while the contents of Z(T,R,M) are moved to Z(F,R,M). The contents of HO are then placed in Z(T,R,M) and the swap is completed. A similar method is used for swapping columns.

Step 210 keeps count of the number of moves and marks the end of the main program loop. Control passes back to step 40 and the screen is set up for your next move.

Steps 1000-1050 are the contents of the LO array and the initial contents of the Z array. LO is the first number, while the next 16 are the color codes for that square. If, in trying to solve the puzzle, you run into a non-solvable setup, check to be sure these numbers are correct. Certain arrangements will preclude a solution, but not give an error message to tell you about it.

These values were obtained by setting up a solution, i.e., making the numbers for square one all zeros, etc., then using the program to scramble the squares. I then recorded the result, translated to the color codes and altered the data. The same method may be used to change the initial setup, but the values should not be altered haphazardly.

Steps 2000-2110 are the title display and direction subroutine called by line 10. The value of P in step 2010 is used to

LO(2)= 7732	SQUARE 2			
	Col. #1	2	3	4
Row # 1	7755 Z(2,1,1)=2 red	7756 Z(2,1,2)=0 black	7757 Z(2,1,3)=2 red	7758 Z(2,1,4)=7 yellow
2	7777 Z(2,2,1)=7 yellow	7778 Z(2,2,2)=6 blue	7779 Z(2,2,3)=7 yellow	7780 Z(2,2,4)=7 yellow
3	7799 Z(2,3,1)=7 yellow	7800 Z(2,3,2)=2 red	7801 Z(2,3,3,)=0 black	7802 Z(2,3,4)=1 white
4	7821 Z(2,4,1)=7 yellow	7822 Z(2,4,2)=1 white	7823 Z(2,4,3)=6 blue	7824 Z(2,4,4)=0 black

Figure 2. This figure illustrates the block positions for square two and shows how they are numbered. It also gives the initial contents and corresponding colors for each block. The top number in each block is the screen location based on LO(2).

create the sound and color display at the start of the program run.

Steps 3000-3100 are the end-of-game subroutine called by line 110. Location 36864 (H), which normally contains 5, is altered to produce the horizontal movement, while 36865 (normally 25) is altered to get vertical movement. These numbers are swapped back and forth in steps 3050 and 3060.

Step 3080 sets the value of A$, and step 3090 causes it to be printed one letter at a time. Step 3100 changes the screen and cursor to purple, causing the word "ready" and the cursor to be invisible. Pressing the CTRL key and one of the other keys will cause the cursor to reappear.

I have included Remarks in the program listing as an aid to understanding it, but recommend they not be typed in, because of the memory they consume.

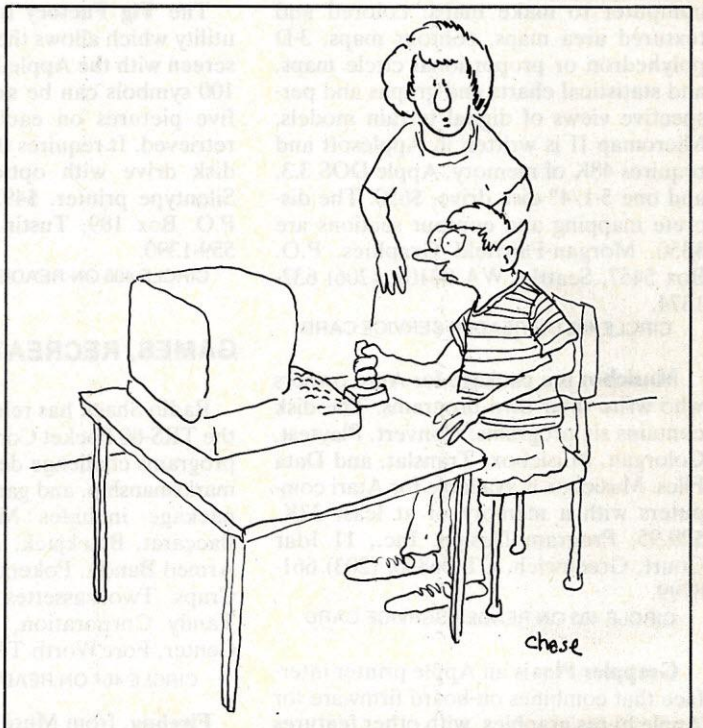
Good luck, and I hope you enjoy Brain Warp. □

Variable Listing

SC	Difference between screen and color locations
CI	Count turns
H	Horizontal screen center
H+1	Vertical screen center
G	Used to set values of H and H+1
V	Volume (36878)
Z(S,R,C)	Puzzle array where S=square number, R=Row number, C=Column number. Value is color code for specified location
LO(S)	Location on screen on which position of square is based
I,J,K	For-next indexes used with array Z
F	Square moving from
T	Square moving to
W$	Used to specify whether you want to move a row or a column
R	Row to be swapped
C	Column to be swapped
M	For-next index used in swaps
HO	Auxiliary variable used in making swaps
P	For-next index used for pauses and in special effects
S,Y	For-next index controlling screen movement in end-game routine
A$	End-game message

Listing 1.

```
5 REM--BRAIN WARP BY DUB SCROGGIN,404 WOODROW ST.,FT. WALTON
  BEACH,FL 32548
10 PRINT"□":SC=30720:CI=0:H=36864:G=5:V=36878:GOSUB2000
20 DIMZ(6,4,4),LO(6)
30 FORI=1TO6:READLO(I):FORJ=1TO4:FORK=1TO4:READZ(I,J,K):NEXTK,J,I
40 PRINT"■■■■    1    2    3":PRINT"■■■■■    4    5    6":
  PRINT"■■"
50 POKEV,15:FORI=1TO6:POKEV-4,135+8*I:FORJ=1TO4:POKEV-2,225+I*J-
  CI:FORK=1TO4
60 POKELO(I)+J*22+K,207:POKELO(I)+SC+J*22+K,Z(I,J,K)
70 NEXTK,J,I:POKEV-2,0
80 FORI=1TO6:FORJ=1TO4:FORK=1TO4
90 IFZ(I,1,1)<>Z(I,J,K)THEN120
100 NEXTK,J,I
110 POKEV-4,0:POKEV,0:PRINT"■■■■  YOU GOT IT IN";CI:PRINT"
       MOVES.":GOSUB3000
120 POKEV,0:POKEV-4,0:PRINT"■■      ■■TURN";CI+1;"■■■"
130 INPUT" MOVE FROM SQ  1■■■!";F:IFF<10RF>6THENPRINT"□
                □":GOTO130
140 INPUT" MOVE TO SQ    1■■■!";T:IFT<10RT>6THENPRINT"□
                □":GOTO140
150 INPUT" ROW OR COL    R■■■!";W$
160 IFW$="C"THEN190
170 INPUT"□ ROW NUMBER    1■■■!";R:IFR<10RR>4THENPRINT"□
                ":GOTO170
180 FORM=1TO4:HO=Z(F,R,M):Z(F,R,M)=Z(T,R,M):Z(T,R,M)=HO:
  NEXTM:GOTO210
190 INPUT"□ COL NUMBER    1■■■!";C:IFC<10RC>4THENPRINT"□
                ":GOTO190
200 FORM=1TO4:HO=Z(F,M,C):Z(F,M,C)=Z(T,M,C):Z(T,M,C)=HO:NEXTM
210 CI=CI+1:PRINT"□":GOTO40
220 END
1000 DATA7726,0,6,7,2,3,2,3,1,3,3,2,3,6,3,0,7
1010 DATA7732,2,0,2,7,7,6,7,7,7,2,0,1,7,1,6,0
1020 DATA7738,7,1,1,0,2,0,6,3,6,1,3,0,0,2,7,6
1030 DATA7858,6,2,3,6,0,1,0,2,1,7,1,2,2,7,3,1
1040 DATA7864,1,3,0,3,6,7,2,6,2,0,6,7,3,6,2,3
1050 DATA7870,3,7,6,1,1,3,1,0,0,6,7,6,1,0,1,2
2000 PRINT"■■■■■■■■■■    BRAIN WARP      ":PRINT"■■■■■■■■■■
     BY DUB SCROGGIN "
2010 POKEV,15:FORP=1TO100:POKEV+1,P*2+24:POKEV-4,200+INT(P/2):
  POKEV-3,200+INT(P/2)
2020 NEXTP:POKEV+1,136:FORP=1TO800:NEXTP:PRINT"■■■      DIRECTIONS
     ■■"
2030 PRINT"THE COMPUTER WILL SET UP 6 SQUARES OF COLOR BLOCKS."
2040 PRINT"■YOUR JOB IS TO MAKE  EACH BLOCK A SOLID  COLOR
  IN AS FEW MOVES"
2050 PRINT"AS POSSIBLE BY EX-    CHANGING A ROW OR A  COLUMN
  IN ANY TWO"
2060 PRINT"SQUARES AS MANY TIMES AS YOU WANT."
2070 PRINT"■ROWS ARE HORIZONTAL  AND NUMBERED 1-4)"
2080 PRINT"(COLUMNS ARE VERTICAL)":POKEV,0:POKEV-4,0:POKEV-3,0
2090 PRINT"■■ HIT ANY KEY TO START ■"
2100 GETA$:IFA$=""THEN2100
2110 PRINT"□":RETURN
3000 FORV=1TO4:POKEV,15:FORP=1TO20:POKEV-2,190+P*2:POKEV-3,190+P*2
3010 FORS=GTOG-5STEP-1:POKEH,S:NEXTS
3020 FORS=G-5TOG+5:POKEH,S:NEXTS
3030 FORS=G+5TOGSTEP-1:POKEH,S:NEXTS
3040 POKEV+1,136+INT(P/4):NEXTP
3050 IFH=36865THENH=H-1:G=5:NEXTV:GOTO3070
3060 H=H+1:G=25:NEXTV
3070 POKEV,0:POKEV-2,0:POKEV-3,0
3080 FORP=1TO2000:NEXTP:PRINT"■   ■";:A$="CONGRATULATIONS!"
3090 FORI=1TO16:PRINTMID$(A$,I,1);:FORP=1TO200:NEXTP,I
3100 FORP=1TO2000:NEXTP:POKEV+1,76:PRINT"■":END
```



"Don't you think you've played enough 'star trek' for today?"

ucts...new products...new

APPLICATIONS SOFTWARE

GRAPHICS AND MUSIC

Graphmagic creates diagrams from mathematical data. Pie charts, line graphs, bar graphs, and scatter diagrams are among the options. The program is compatible with DIF data, costs less than $100, and requires an Apple II with a disk drive. International Software Marketing, 120 E. Washington St., Suite 421, University Bldg., Syracuse, NY 13202.

CIRCLE 400 ON READER SERVICE CARD

The **Game Application Package** makes it possible for Applesoft programmers to program animated graphics. It costs $49.95 and requires DOS 3.3, 48K, and Applesoft. Synergistic Software, 830 North Riverside Dr., Suite 201, Renton, WA 98055.

CIRCLE 401 ON READER SERVICE CARD

Micromap II is used on a microcomputer to make maps: colored and textured area maps, contour maps, 3-D polyhedron or proportional circle maps, and statistical charts and graphs and perspective views of digital terrain models. Micromap II is written in Applesoft and requires 48K of memory, Apple DOS 3.3, and one 5-1/4" disk drive. $650. The discrete mapping and contour sections are $350. Morgan-Fairfield Graphics, P.O. Box 5457, Seattle, WA 98105. (206) 632-1374.

CIRCLE 402 ON READER SERVICE CARD

Musicbox is a package for Atari owners who write their own programs. The disk contains six programs: Convert, Playtest, Colorgan, Musicbox, Translat, and Data Files. Musicbox is available for Atari computers with a memory of at least 32K. $29.95. Program Design, Inc., 11 Idar Court, Greenwich, CT 06830. (203) 661-8799.

CIRCLE 403 ON READER SERVICE CARD

Grappler Plus is an Apple printer interface that combines on-board firmware for Apple hi-res graphics, with other features such as Apple III compatibility, an on-board dip switch for printer selection, and Orange Micro's Dual Hi-Res Graphics. A single Grappler Plus interface is compatible with the NEC 8023, Centronics 739, C. Itoh Prowriter, Anadex, Okidata, Datasouth DS-180 and the line of Epson printers. Also it is Apple, Pascal, CP/M, and Logo compatible. Orange Micro, Inc., 3150 E. La Palma, Suite G, Anaheim, CA 92806. (714) 630-3620.

CIRCLE 404 ON READER SERVICE CARD

Hiresl and **Hires2** are high-speed, high-resolution drivers for 48K or 16K LNW-80 computers. They use the 480 x 192 graphics capability of the LNW. Features included are: LINE draw/erase, CIRCLE draw/erase, check DOT on/off, TONE generation, and a character table for 80 x 16 or 80 x 24 text display. The length of both drivers is less than 2500 bytes. They come with five demonstration programs, and are available on cassette or single-density diskette. $20. Emert/Hummel Software, 4943 Antioch Blvd., Baton Rouge, LA 70816. (504) 293-3400.

CIRCLE 405 ON READER SERVICE CARD

The **Fig Factory** is a hi-res graphics utility which allows the user to sketch on-screen with the Apple III computer. Over 100 symbols can be sketched, and up to five pictures on each diskette can be retrieved. It requires the 128K-1 external disk drive with optional joystick and Silentype printer. $49.95. Sun Software, P.O. Box 189, Tustin, CA 92680. (714) 559-1390.

CIRCLE 406 ON READER SERVICE CARD

GAMES, RECREATIONAL

Radio Shack has released **Games II** for the TRS-80 Pocket Computer. Eight game programs challenge deductive reasoning, marksmanship, and gambling talents. The package includes Missile Marksman, Baccarat, Blackjack, Aceydeucey, One-Armed Bandit, Pokerslot, Numguess and Craps. Two cassettes retail for $14.95. Tandy Corporation, 1800 One Tandy Center, Fort Worth TX 76102.

CIRCLE 407 ON READER SERVICE CARD

Firebug, from Muse Software, is a new game by Silas Warner. The scenario puts you, the Firebug, at the top of a five-story maze, complete with burning fuse, gasoline cans, and the dare to burn down the floors one at a time. The game runs on the Apple II or Apple II+ with 48K and disk drive, and costs $24.95. Muse, 347 N. Charles St., Baltimore, MD 21201.

CIRCLE 408 ON READER SERVICE CARD

Star ships confront alien attack ships and an intergalactic leech in **K-Star Patrol**. The package contains one ROM cartridge and a 12-page color instruction booklet. The cartridge fits Atari 400 and 800 Personal Computer Systems. K-Byte, Division of Kay Enterprises Co., 1705 Austin St., Troy, MI 48084. (313) 524-9878.

CIRCLE 409 ON READER SERVICE CARD

Alien Garden is a strategy-action game in which the player must eat life-giving crystals while avoiding death-making crystals. The game sells for $39.95 in cartridge form and requires an Atari 400 or 800. Epyx, P.O. Box 4247, Mountain View, CA 94040.

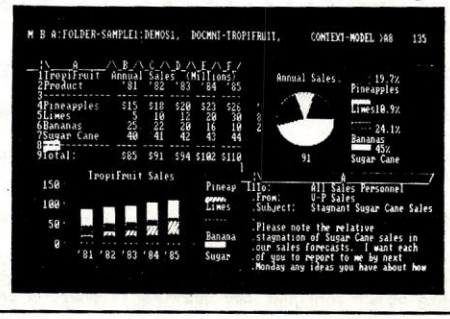
CIRCLE 410 ON READER SERVICE CARD

King Cribbage is a new version of the age old English card game. The King plays six-card cribbage as dealt from a standard 52-card deck. The program retails for $24.95 and requires an Apple II, 48K, and a disk drive. Hayden Book Company, 50 Essex St., Rochelle Park, NJ 07662.

CIRCLE 411 ON READER SERVICE CARD

BUSINESS

The **Context MBA** incorporates spreadsheet, word processing, graphics, and database functions in one package. A telecommunications feature will soon be added and will be provided as a no-cost upgrade to early buyers of the package.



The system requires an IBM Personal Computer, 256K, 2 disk drives, and color graphics card. Context Management Systems, 23864 Hawthorne Blvd., Suite 100, Torrance, CA 91604.

CIRCLE 412 ON READER SERVICE CARD

Servicemanager is a business software package which performs administrative and clerical chores for repair shops and service departments. It has word processing capability and prints all standard forms. It runs on the Apple III with the ProFile hard disk or 5-1/4" diskettes. The Denver Software Company, 14100 E. Jewell Ave., Suite 15, Aurora, CO 80012. (303) 750-9980.

CIRCLE 413 ON READER SERVICE CARD

The Execuware **Economic Order Quantity** package is a cost control software package for use with the Apple II, Apple II plus, and IBM personal computers. Execuware minimizes inventory costs while maintaining ideal stocking levels. Microcomputer Software Division of Aeronca, Inc., 4530 Park Rd., Suite 348, Charlotte, NC 28209. (704) 525-9881.

CIRCLE 414 ON READER SERVICE CARD

VersaForm Business Form Processor allows a nonprogrammer to set up business forms on the Apple computer, to store them as files, and to generate analyses and management reports for their data. VersaForm may be installed on Apple systems using ProFile, Corvus, and other hard disks supporting the Pascal operating system. Both Apple II and Apple III versions have 80-column screen formats. $495. Applied Software Technology, 14125 Capri Dr., Los Gatos, CA 95030. (408) 370-2662.

CIRCLE 415 ON READER SERVICE CARD

The Accountant Finance Database System is a double entry system that permits those who are not familiar with accounting terminology to use the double entry process. It requires an Apple II computer with 48K of RAM and can operate with one or two disk drives. Decision Support Software, 1438 Ironwood Dr., McLean, VA 22101. (800) 368-2022.

CIRCLE 416 ON READER SERVICE CARD

The TRS-80 **Expense Ledger** is for business/personal payments and keeps a one disk record of payments made during any year or part-year period. Entries can be reviewed by part-screen scrolling, edited, deleted or added to, and machine-language sorting puts entries into date order. The program is for TRS-80 Models I and III, and is available in 48K (470 entries) and 32K (200 entries) versions. $35. Manhattan Software, P.O. Box 1063, Woodland Hills, CA 91365. (213) 704-8495.

CIRCLE 417 ON READER SERVICE CARD

The **Prompt Accurate Cost Estimator** is a flexible general purpose estimating product which aids in appraising and estimating equipment, labor, material, and general project needs. P.A.C.E. requires a 64K IBM-PC with the IBM UCSD p-system or a 64K Apple II or 128K Apple III with Apple Pascal. All versions require a 132-column printer. $395. High Technology Software Products, Inc., P.O. Box 14665, 2201 N.E. 63rd St., Oklahoma City, OK 73113. (405) 478-2105.

CIRCLE 418 ON READER SERVICE CARD

An Apple II medical applications software system, **Automated Medical Administrator**, is designed to automate the accounts receivable and claim form preparation tasks of the multi-doctor medical practice. The system allows for the maintenance of up to 200,000 accounts for up to ten physicians. Boardroom Executive Software, Suite 240, Airport Park Plaza, 255 North El Cielo Rd., Palm Strings, CA 92262. (714) 365-6770.

CIRCLE 419 ON READER SERVICE CARD

A **Business Bookkeeping System** for small businesses is a set of menu-driven ledgers that allows the user to switch to an accrual system later. Some of the features are three cash basis activity ledgers, a complete general ledger, a security password for accessing employee information, and other reports. Dakin 5 Corporation, P.O. Box 21187, Denver, CO 80221. (303) 426-6090.

CIRCLE 420 ON READER SERVICE CARD

Inventory Manager is an inventory control software package for the Apple II computer. It can deal with 2700 different inventory items on a two disk system, and

Peripherals Unlimited... FANTASTIC PRICES!

OUR FAST SERVICE, PRODUCT SELECTION AND OUR CUSTOMERS' SATISFACTION MAKE US #1.

Microsoft Z-80 Softcard	$214
Microsoft RAMCARD	$129
Z-90-64K DO	$2588
Z-19 Terminal	$777
Z-121 Monitor 12"	$149

ATARI COMPUTERS

Atari 800 16K	$649
Atari 400	$318
Atari Interface Module	$174
Atari 810 Single Disk	$444
Atari 830 Modem	$166
Programmer	$59
Entertainer	$84
Star Raiders	$34
16K Mem. Exp. for Atari	$74
32K Mem. Exp. for Atari	$114

NEC PRINTERS

7710/30 Spinwriter R/O	$2295
7720 Spinwriter KSR	$2649
3510/30 Spinwriter R/O	$1689

NEC DOT MATRIX

PC-8023	$474

Call for prices on ribbons, etc.

OKIDATA & MORE

Okidata Microline 82A	$459
Okidata Microline 83A	$699
Okidata Microline 84 (P)	$1069
Okidata Microline 84 (S)	$1099
Tractor (OKI 80 & 82 only)	$60
Diablo 620	$1239
Diablo 630	$1999
IDS Microprism	$539.00

AMDEK & NEC MONITORS

Amdek 12" 300 GRN Phospor	$149
Amdek 13" Color I	$319
Amdek 13" Color II	$739
Amdek 13" Color III	$429
NEC JB1201 GRN Phospor	$149
NEC JC1201 Color	$339

EPSON PRINTERS

MX-80 w/Graphtrax Plus	$469
MX-80FT (Friction & Tractor)	$529
MX-100 (15" Carriage)	$699
Grappler Interface	$129

Call for prices on Ribbons, Cables & Interfaces

NEC-PC 8000 Series Microcomputer

PC-8001A Computer w/32K	$888
PC-8012A w/32K + Exp. Slots	$588
PC-8031A Dual Mini Disk	$888
PC-8032A Add-on Mini Disk	$777

Call for Software Prices

FOR THE LOWEST PRICE CALL TOLL FREE

1-800-343-4114

ORDERING INFORMATION

Our order lines are open 9AM to 6PM EST Monday thru Friday. Phone orders are welcome; same day shipment on orders placed before 10AM. Free use of Mastercard and VISA. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision. C.O.D.'s accepted.

For service, quality and delivery call:

PERIPHERALS UNLIMITED
(617) 655-7400
62 N. Main St. • Natick, MA 01760

CIRCLE 233 ON READER SERVICE CARD

New Products, continued...

can break the items down into 13 different categories. Inventory Manager issues reports which summarize profit margins, calculate wholesale to retail mark-ups, list back order status, print purchase orders, and more. $149.95. **Integer Basic Compiler** is a utility software program for the Apple II computer with Integer Basic. Standard features include full support of hi-res and lo-res graphics and full support of lower case characters, disk error recovery, CHR$, GET, and KEY functions. The IBC requires an Apple II computer, 48K, DOS 3.3, and one disk drive. $149.95. Synergistic Software, 830 N. Riverside Dr., Suite 201, Renton, WA 98055. (206) 226-3216.

CIRCLE 421 ON READER SERVICE CARD

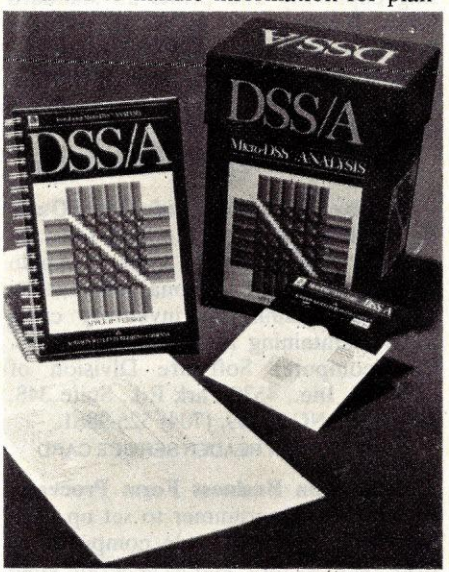
Loan Sales/Purchase Analysis is a program for analyzing the sale or purchase of a loan. Loans of any amount, bearing any interest rate and due date can be handled by this program. Loans in foreign currencies may be analyzed as well as loans in U.S. dollars. Loan Sales/Purchase Analysis is available on diskette or cassette for the Apple II or III and TRS-80 Model I or III. $50. Realty Software Company, 1116 'E' 8th St., Manhattan Beach, CA 90266. (213) 372-9419.

CIRCLE 422 ON READER SERVICE CARD

The **Integrated Business Information System** is a set of accounting packages designed for the DEC VT180 and the Rainbow, DECmate II and Professional Series computers. IBIS is for professional accounting firms, bookkeeping agencies, and small businesses. It generates user defined financial statements and more than 25 printed reports for financial analysis and planning. PDS Microsystems, P.O. Box 5369, Carson, CA 90749. (213) 538-3982.

CIRCLE 423 ON READER SERVICE CARD

The Micro-DSS/Analysis software package is a support tool that enables managers, analysts, and policy administrators to handle information for planning, evaluation, and reporting. It is available for the 48K Apple II with Pascal, two floppy disk drives, monitor, and printer. $495. Addison-Wesley Publishing Company, Inc., Jacob Way, Reading, MA 01867. (617) 944-3700.



CIRCLE 424 ON READER SERVICE CARD

Ag/Pac is an agricultural software package which enables the user to view a wide range of alternatives in common agricultural problem areas. Ag/Pac consists of 80 agricultural programs packaged in 32 modules, and will run on most microcomputers. Wisconsin Microware, One South Park St., Suite 220, Madison, WI 53715. (608) 255-9020.

CIRCLE 425 ON READER SERVICE CARD

WORD PROCESSING

Footprint! is a text formatting program which is compatible with any text editor and computer and for which a Pascal compiler is available. It can be used by law firms and businesses of any size in their word processing centers. A single user license for a microcomputer configuration is $200. Alexander Hamilton Institute, Inc., 1633 Broadway, New York, NY 10019. (212) 619-3346.

CIRCLE 426 ON READER SERVICE CARD

Copyart II is a word processor that offers graphics, math, sorting, and mail-merge utilities. Columns may be created for journals and reports, and Copyart II can be used to edit Basic programs. The

For Apple II

NEW FOR AGES 3-9

Classic Family Software ™

Introduces

Micro Mother Goose

Fun Games For Kids

At last, arcade quality games for kids. Imagine your children laughing with excitement as they too join in video fun. No reading required to operate. "The first computer activity my four year old daughter really enjoyed."

Musical Computer Comics

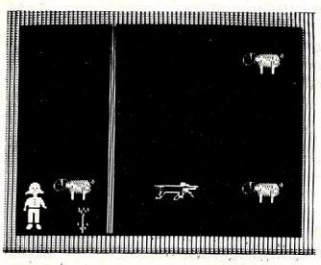
Enjoy good feelings with your children as you read and sing popular Mother Goose rhymes together. Complete illustrated parents manual provided.

Free Stickers & Poster

Your kids will love their color Mother Goose stickers. And the large color "Micro Do's and Don'ts" poster shows the "rules of the road" for happy and safe family computing.

Ask For It... At Your Local Store

Don't wait. Take this ad to your local computer store today and get your kids "Micro Mother Goose."



3 fun-filled Mother Goose games start easy for the little ones, but challenge all at higher levels.

9 magical Mother Goose rhymes are so easy to run even 3 year olds can operate successfully.

Graphics created with The Graphics Magician

Apple II is a Trademark of Apple Computer, Inc.

Software Productions, Inc.

2357 Southway Drive
P.O. Box 21341
Columbus, OH 43221
(614) 486-3563

CIRCLE 265 ON READER SERVICE CARD

program runs on the TRS-80 Model I and III or LNW. $149.95. Simutek Computer Products Inc., 4897 E. Speedway Blvd., Tucson, AZ 85712. (602) 323-9391.

CIRCLE 427 ON READER SERVICE CARD

PERSONAL

Quikcalc Real Estate Investor is a real estate financial analysis package for 8" CP/M systems. It requires SuperCalc and a minimum of 64K, and is used on the Apple and IBM Personal Computers with VisiCalc. Two models, individual residence and income property, are available. $129.95. Simple Soft, Inc., 480 Eagle Dr., Suite 101, Elk Grove, IL 60007. (312) 364-0752.

CIRCLE 428 ON READER SERVICE CARD

Market Analyst is a software package for the stock market investor. The system features Technical Analyst for computerized charting, Portfolio Manager to monitor holdings, and News, Views and Quotes for on-line information access. It runs on an Apple II/II Plus equipped with a 16K RAM card, a color or black and white monitor, and one or more disk drives. $295. Anidata, 613 Jaeger Ct., Sicklerville, NJ 08081.

CIRCLE 429 ON READER SERVICE CARD

Darkstar provides advice on matters pertaining to the darkroom. It is available for the Sinclair ZX81, Apple II and Atari on either tape or disk. $129.95. F/22 Press, P.O. Box 141, Leonia, NJ 07605. (201) 568-6250.

CIRCLE 430 ON READER SERVICE CARD

UTILITIES AND MISCELLANEOUS

Synergistic Software has released **The Programmer's Workshop**, a new utility series for the 32K Atari 400/800 computer with one disk drive. The package consists of seven separate programs designed to assist in programming. $34.95. Synergistic Software, 830 North Riverside Dr., Suite 201, Renton, WA 98055.

CIRCLE 431 ON READER SERVICE CARD

Macro-80C is a macro assembler, screen-oriented editor, and machine language monitor for the Radio Shack Color Computer. 16K and a Radio Shack disk drive are required. The price is $99.95. Micro Works, P.O. Box 1110, Del Mar, CA 92014.

CIRCLE 432 ON READER SERVICE CARD

The Filer is an Apple utility system for 35-, 40- and 70-track drives. It contains a disk drive speed check, disk drive test, fast copy program, and a file manager. Options include: Catalog with space on disk, Copy files, Copy disk, Copy DOS, Delete, Lock and Unlock Files, and Change Booting Program. $19.95. Central Point Software, Inc., P.O. Box 19730-#203, Portland, OR 97219. (503) 244-5782.

CIRCLE 433 ON READER SERVICE CARD

Searching for software? Go to the source! creative computing 1982 Software Buyers Guide

Finding the right software can be confusing with so many different programs on the market. But now there's one place you can go to get the facts you need:

Creative Computing

1982 Software Buyers Guide!

This new, easy-to-use guide puts it all together for you in a comprehensive assemblage of product-review reprints from *Creative Computing*. You'll find over 150 programs covered, including:

Applications Software for:

- Business
- Word processing
- Financial analysis
- Property management
- Education
- Graphics
- Music
- Games and recreation

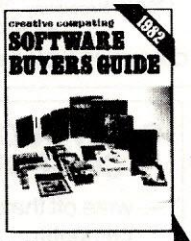
Systems Software for:

- Operating systems
- Languages and compilers
- Assemblers and disassemblers
- Disk utilities
- Data base management
- Communications
- Software development and programming aids

Each program evaluation has a "quick reference box" showing system requirements, format, language, price, manufacturer, and a brief summary.

You'll also find a Directory of Manufacturers, cross-referenced to type of computer.

The SOFTWARE BUYERS GUIDE is the one place to look for help and information when making buying decisions. Save yourself time, trouble and money—get your copy today!



Only $3.95!

SOFTWARE BUYERS GUIDE
P.O. Box 640
Holmes, PA 19043

Please send me the *Creative Computing* 1982 SOFTWARE BUYERS GUIDE. I enclose $5.00 ($3.95* plus $1.05 postage and handling). $6.00 outside U.S.A.

Mr.
Mrs.
Ms. _____
(please print full name)

Address _____ Apt. _____

City _____

State/Zip _____

*NJ residents add 5% sales tax

EDUCATIONAL SOFTWARE
TRS-80, COLOR COMPUTER, PET & APPLE II

ELEMENTARY	MATH
SCIENCE	HISTORY
GEOGRAPHY	ACCOUNTING
ECONOMICS	BUSINESS ED.
FOREIGN LANG.	PHYSICS
GRAMMAR	FARM RECORDS

Write for FREE Catalogue:

MICRO LEARNINGWARE, Box 2134, N Mankato, MN 56001
(507) 625-2205
VISA & MASTER CARD ACCEPTED

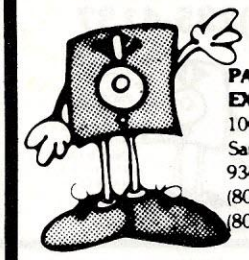
We pay 15% royalty for Educational Programs listed with us.
TRS-80 is a registered trademark of TANDY CORP.
PET is a trademark of COMMODORE BUS. MACHINES.
APPLE is a trademark of APPLE COMPUTER CO.

CIRCLE 205 ON READER SERVICE CARD

MEMOREX
FLEXIBLE DISCS

WE WILL NOT BE UNDERSOLD! Call Free **(800)235-4137** for prices and information. Dealer inquiries invited and C.O.D.'s accepted.

VISA



PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA 93401 In Cal. call (800)592-5935 or (805)543-1037

CIRCLE 226 ON READER SERVICE CARD

D/Punch?

D/Punch Conversion Kits will help you **SAVE MONEY, SAVE STORAGE SPACE, SAVE TIME.** D/Punch Kits are engineered so you can quickly, accurately, & safely make alterations necessary to let you use both sides of your H or S sectored SINGLE-SIDED Diskettes. Converting 1 box of diskettes will more than pay for each D/Punch Kit. * Hub-Reinforcer Kit accurately positions Hub-Reinf. Ring to hub opening. * Disk-Sleeve lets you replace your lost or damaged sleeves. Indicate your system config. with order.

a. D/Punch Kit A — (5¼" drives & eq.) for ex. [Apple, Atari, CBM 4040, Franklin]	$ 6.95
b. D/Punch Kit B — (5¼" drives & eq.) for ex. [TRS 80 (Mod I, III), IBM, Osborne, Zenith]	14.95
c. D/Punch Kit C — (8" drives & eq.) for ex. [Altos, Zenith, TRS 80 Mod II]	16.95
d. Labels — [100 pcs]	3.00
e. Write-Protect Stickers — [100 pcs]	2.65
f. Hub-Reinforcer Kit (5¼")	10.99
g. Hub-Reinforcer Kit (8")	12.99
h. Hub-Reinforcer Rings (5¼") — [50 pcs]	5.85
i. Hub-Reinforcer Rings (8") — [50 pcs]	6.20
j. Disk Sleeves (5¼") — [10 pcs]	2.35
k. Disk Sleeves (8") — [10 pcs]	3.85

Add: $2 shipping & handling for each $15 order increment. AK, HI, & overseas cust.: write for S&H charges. MA res. add 5% tax. Send check or money order to:

D/Punch Co. (CC) 12
P.O. Box 201, Newton Hlds, MA 02161
Tel: (617) 964-2126 Telex: 4991009 CHTRI
©1982, D/Punch Corp., Pat. Pend.

CIRCLE 164 ON READER SERVICE CARD

HOUSEHOLD INVENTORY PROGRAM FOR AN APPLE II

WILL STORE EVERY HOUSEHOLD ITEMS'
- SERIAL NUMBER
- MODEL NUMBER
- PURCHASE PRICE
- REPLACEMENT COST
- AND MORE

SEND $30 (CHECK OR M.O.) AND STATE PRINTER/MODEL TO:
SFA ENTERPRISES, INC.
P.O. BOX 33511
NORTHGLENN, CO 80233

CIRCLE 251 ON READER SERVICE CARD

CONTROL DATA
DISKETTES

5 1/4" SPECIFY SOFT. 10 or 16 SECTORS

	PRICE/10	PRICE/50	PRICE/100
SSSD	$23.00	$112.00	$215.00
SSDD	26.00	126.00	235.00
DSDD	32.00	156.00	295.00

8" SPECIFY SOFT or 32 SECTORS

	PRICE/10	PRICE/50	PRICE/100
SSSD	$25.00	$122.00	$223.00
SSDD	30.00	145.00	263.00
DSDD	34.80	165.00	303.00

CALL TOLL FREE - ORDERS ONLY
800-824-7888 ALL STATES EXCEPT CA
800-852-7777 FOR CA RESIDENTS
ASK FOR OPERATOR #906

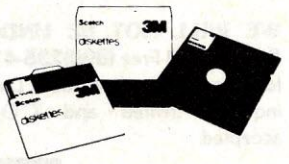
CHECKS, M.O., VISA, M.C. - ADD $2.00 SHIPPING
CA RESIDENTS ADD 6% SALES TAX

Creativity Unlimited
P.O. Box 3304, Saratoga, CA 95070-1304

CIRCLE 154 ON READER SERVICE CARD

Scotch® Diskettes

Rely on Scotch® diskettes to keep your valuable data safe. Dependable Scotch diskettes are tested and guaranteed error-free. The low abrasivity saves your read/write heads. They're compatible with most diskette drives.



(800)235-4137

PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo, CA
93401. In Cal. call
(800)592-5935 or
(805)544-1037

Dealer Inquiries Invited

CIRCLE 226 ON READER SERVICE CARD

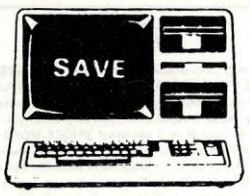
DAISY WHEEL
TYPEWRITER/PRINTER
SMITH CORONA® ULTRASONIC™
Use with CBM®, PET®, APPLE®, VIC®, ATARI®, TRS-80®, OSBORNE-1®, IBM®
Excellent typewriter with automatic lift-off correction; changeable daisy print wheels only $4.95; 120 words per minute. ***Uses similar print mechanism as*** **Smith-Corona® TP-1™.** *Rugged carrying case included.*

$799.00

TP-1 TEXT PRINTER $599.00
CENTRONICS PARALLEL

BUSINESS MACHINE CONSULTANTS
Mailing address:
1735 N. Broadway - Walnut Creek, CA 94596
415-930-9600

CIRCLE 124 ON READER SERVICE CARD



RADIO SHACK TRS-80's™

We offer Special Discounts, Free Shipping and a Toll Free Order Number

1-800-531-7466 TOLL FREE

Pan American Electronics

Dept. CC - 1117 Conway Avenue
Mission, Texas 78572
(512) 581-2766 Telex 767339

CIRCLE 228 ON READER SERVICE CARD

CASH IN ON THE HOME COMPUTER BOOM!

— write off the cost of your computer.
— increase your tax deductions.
— earn $2000 - $3000 / per month by multi-level marketing of computers.
— start your own in-home business.

CALL PAUL COHEN
Days/Evenings 213-476-7697

or Write

CHECKMATE,
A Division of
D. Paul Cohen Enterprises, Inc.
152 South Sepulveda
Los Angeles, California
90049

CIRCLE 314 ON READER SERVICE CARD

New Products, continued...

Deadline Calendar is a system that provides a way of scheduling as much as possible without overscheduling. A different schedule can be used for each person, manufacturing machine, etc. It operates on TRS-80 Model I and Model III with minimum of 32K, one disk drive and printer. $160. Lefkoff Innovation Corp., P.O. Box 28347, Washington, DC 20005. (202) 547-2789.

CIRCLE 434 ON READER SERVICE CARD

VIZ.A.CON can add a third dimension to VisiCalc models. It can combine multiple pages of VisiCalc data from a model for consolidation or for summations over periods of time. VIZ.A.CON runs on the Radio Shack TRS-80 Model I/III. $89.95. Abacus Associates, Suite #240, 6565 W. Loop So., Bellaire, TX 77401. (713) 666-8146.

CIRCLE 435 ON READER SERVICE CARD

Seven software programs are available for the IBM-PC with 48K memory, one disk drive, DOS and disk Basic, and either monochrome or color graphics. **String Sort** is a machine language sort routine that will sort any string array into ascending alphabetical order. $24.95. **Electronic Disk** permits the use of expanded capacity disk drives and allows RAM memory to be used as an electronic disk drive and a printer spooler. $69.95. **ISAM Database** provides keyed access to data files for reading, writing, updating, and deleting records within the file. $69.95. **Cross Reference** lists alphabetically all variables and the line numbers where the variables occur. The program may be saved on disk in either ASCII or binary format. $24.95. **Games Package 1** is a collection of ten games including Qubic, Othello, Cribbage, Space Trek, Black Jack, Master Mind, Americans Quiz and others. $29.95. **HP7470 Plotter Demo** has nine demonstration programs including 12-Month Trend and Phone Chart. $24.95. **Bowling League Statistics Manager** maintains all bowling league statistics and memberships, computes individual handicaps and team standings, and prints reports. $99.95. Ensign Software, 2312 N. Cole Rd., Suite E, Boise, ID 83704. (208) 378-8086.

CIRCLE 436 ON READER SERVICE CARD

CatalogCard and LabelWriter is an Apple II program that generates catalog cards and spine labels. The program requires a standard 80-column printer (Epson, Centronics, Microline, etc.), a lower case adaptor, and continuous-form cards and labels. The program is available on a 30-day on-approval basis for $199 with a lower case adaptor and $169 without the adaptor. The **Library Circulation Management Program** is for the TRS-80 and Apple II. It is for small school libraries, and records information for 300 students borrowing up to six books each.

The system requires a 32K TRS-80, Model III or Model II, or Apple II with at least one disk drive and any 80-column printer. $240. K-12 MicroMedia, 172 Broadway, Woodcliff Lake, NJ 07675. (201) 391-7555.

CIRCLE 437 ON READER SERVICE CARD

Diskovery is an Apple disk utility package that supports 35-, 40-, 70-, and 80-track drives in 13- and 16-sector formats including CP/M and Pascal. Diskovery includes several programs for repairing damaged diskettes, undeleting files, testing drive speed, and more. A 130-page manual is included in the $59.95 price. Micro Mantic Computer, 541 N.E. McWilliams Rd., Bremerton, WA 98310. (206) 373-9231.

CIRCLE 438 ON READER SERVICE CARD

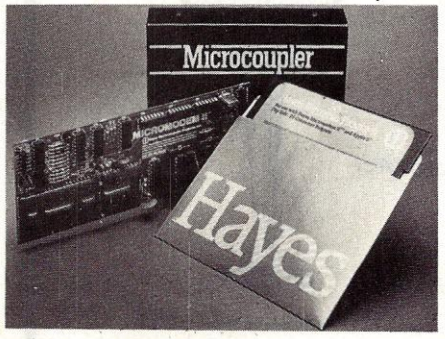
Basic Aid is an enhancement to the TRS-80 Color Computer. It contains features such as automatic line numbering and single key entry of most Basic commands. The Merge command allows Basic routines stored on cassette to be merged with the program in memory. The Move Line command allows any program line or lines to be moved anywhere and renumbered. Basic Aid comes in a ROM cartridge. $39.95. Eigen Systems, Box 10234, Austin, TX 78766. (512) 837-4665.

CIRCLE 439 ON READER SERVICE CARD

Apple computer users can plug into the Prestel World Videotex Service with an **Appletel Disk**. This software turns the personal computer into a terminal to retrieve international data including updated prices of commodities, currency exchange and IMM rates, and stocks. Other useful databases include financial/management information, economic indicators, locations of deep sea ships, hotel bookings, and international news, sports, and weather. Logica/BVT, 666 Third Ave., New York, NY 10017. (212) 599-0828.

CIRCLE 440 ON READER SERVICE CARD

The **Terminal Program** for the Hayes Micromodem II and Apple II is a software package for communicating over telephone lines with other computers. It originates and answers calls; creates, lists, sends, and receives files; and manages communications parameters. It is compatible with three Apple operating systems: DOS 3.3, Pascal, and CP/M. The



Statement of Ownership

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Required by 39 U.S.C. 3685). 1. Title of publication: Creative Computing. A. Publication No. 00978140. 2. Date of Filing: October 1, 1982. 3. Frequency of issue: Monthly. A. No. of issues published annually: 12. B. Annual subscription price: $24.97. 4. Location of known office of publication: 39 E. Hanover Avenue, Morris Plains, NJ 07950. 5. Location of the headquarters or general business office of the publishers: 39 E. Hanover Avenue, Morris Plains, NJ 07950. 6. Names and complete addresses of publisher, editor, and managing editor: Publisher, None. Editor, Elizabeth P. Staples, 39 E. Hanover Ave., Morris Plains, NJ 07950. Managing Editor, Peter Fee, 39 E. Hanover Ave., Morris Plains, NJ 07950. 7. Owner: Ahl Computing, Inc., 39 E. Hanover Ave., Morris Plains, NJ 07950; Ziff-Davis Publishing Company, One Park Ave., NY, NY 10016. 8. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None.

10. Extent and nature of circulation	Average No. Copies each issue during preceding 12 months	Actual No. Copies of single issue published nearest to filing date
A. Total No. Copies Printed (Net Press Run)	189,521	221,177
B. Paid Circulation 1. Sales through Dealers and Carriers, Street Vendors and Counter Sales	50,081	57,400
2. Mail Subscriptions	104,691	107,794
C. Total Paid Circulation (Sum of 10B1 and 10B2)	154,772	165,194
D. Free Distribution by Mail, Carrier or Other Means Samples, Complimentary, and Other Free Copies	3,534	4,358
E. Total Distribution (Sum of C and D)	158,306	169,552
F. Copies not Distributed 1. Office use, Left Over, Unaccounted, Spoiled After Printing	1,696	1,025
2. Returns from News Agents	29,519	49,600
G. Total (Sum of E, F1, and 2—should equal net press run shown in A)	189,521	221,177

11.
I certify that the statements made by me above are correct and complete.
WILLIAM L. PHILLIPS, Assistant Treasurer

Unusual software
FROM
TYRANT®
FOR
Atari 400, Vic 20, TI 99/4
Timex 1000, Sinclair ZX81
TITLES INCLUDE
PARTY GAMES ☐ PARTY GAMES FOR CONSENTING ADULTS ☐ COLLEGE and PRO BASKETBALL ☐ FOOTBALL ☐ US OPEN GOLF and TENNIS ☐ Z-TREK TRIVIA QUIZ ☐ PRIMARY (age 3 to 6) ASSOCIATION ☐ ARITHETIC BASEBALL
SEND $1.00 FOR CATALOGUE (credit on first order) TO:
TYRANT.....Software
BOX 31569, AURORA, COLO. ☐ 80041

CIRCLE 288 ON READER SERVICE CARD

Verbatim® Diskettes

Top-quality Verbatim® Diskettes from **Tech•Data**, your complete word and data processing supply center. Dealer inquiries invited.
Call Toll Free
1-800-237-8931.
In Florida, call
813-577-2794.
Tech•Data Corporation
3251 Tech Drive North
St. Petersburg, FL 33702

CIRCLE 278 ON READER SERVICE CARD

*IBM-PC **TRS 80
***ATARI ****NEC
"Quality Computer Products at Sensible Prices"

EARTH ATTACKERS 19.95
- Great graphics, quick action
- TRS 80-II, with Basic

UTILITIES 19.95
- Collection of software tools (Printer setup, file conversion and more)
- IBM-PC with DOS Basic

MAIL LIST and LABEL control program 49.95
- User Friendly
- IBM-PC

BASIC CROSS REFERENCE 49.95
- TRS 80-II with Basic

ATARI-400 48K upgrade kit (introductory offer) 99.95
- Simple 1-hour installation
- Everything you need (except soldering iron)

RACET computes, ltd. software
- Michael Shrayer's ELECTRIC PENCIL (NEC) 99.95
- All other RACET products

MSX Micro Systems Exchange
P.O. Box 4033 Concord CA 94524 (415) 355-7130

*Trademark International Business Machines Corp
**Trademark Tandy Corp.
***Trademark of Atari, Inc.
****Trademark NEC

CIRCLE 209 ON READER SERVICE CARD

New Products, continued...

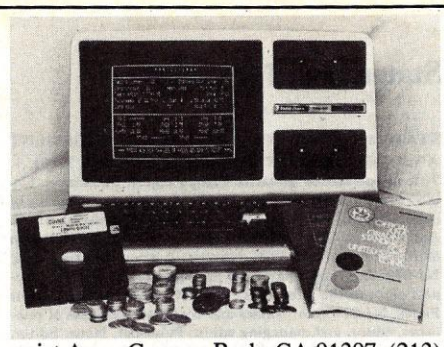
program supports up to six disk drives, several printer interface cards, 40- and 80-column screens, and lower case characters through hardware modifications. The Micromodem II system connects directly to the telephone line. The terminal program is $79, and the Micromodem II package is $399. Hayes Microcomputer Products Inc., 5835 Peachtree Corners East, Norcross, GA 30092. (404) 449-8791.

CIRCLE 441 ON READER SERVICE CARD

Key-Wiz is a multi-key search utility designed to search a file of index cards and find all entries which match a profile of keywords. Included with Key-Wiz is Sort-Wiz, a utility that provides a way to sort the data files. Key-Wiz is available in ABS or COM format on a 5-1/4" hard sector diskette for HDOS or CP/M and may be used on a Heath H8 or Heath/Zenith H89 with 48K memory. $19.95. Interactive Micro Systems, P.O. Box 21007, Columbus, OH 43221. (614) 363-1534.

CIRCLE 442 ON READER SERVICE CARD

Computerized Inventory System is a computer program for coin collectors. Coins is intended to run on either the TRS-80 Model I or Model III, 48K, with two disk drives. An updated value file is included. $95. Compu-Quote, 6914 Berquist Ave., Canoga Park, CA 91307. (213) 348-3662.



CIRCLE 443 ON READER SERVICE CARD

Platinum **Worksaver** is a programming aid that is designed for the 16K TRS-80 Color Computer and occupies less than 2K of memory. It provides full screen editing of Basic programs with automatic line numbering, changes, deletes, and inserts, using a movable cursor. $30. Platinum Software, P.O. Box 833, Plattsburgh, NY 12901. (518) 643-6796.

CIRCLE 444 ON READER SERVICE CARD

EZ-Camp is a set of programs designed for camp management. This system maintains complete camper information and can produce mailing lists, medical records, bunk lists, and other camp reports. It is to be used on the TRS-80. $50. EZR Micro, Inc., 11 Conwell Dr., Maple Glen, PA 19002.

CIRCLE 445 ON READER SERVICE CARD

Comcom enables any CP/M-based computer to access time-sharing systems, databases, bulletin boards, or other computers via any link the CP/M system supports (e.g., RS-232, modem, parallel port). Various options allow communication with almost any computer system, and may be used for functions such as local modem control and auto-dialling. Comcom is written in Z80 macro-assembly language. Compu-Draw Software, 1227 Goler House, Rochester, NY 14620. (716) 454-3188.

CIRCLE 446 ON READER SERVICE CARD

MergeCalc merges VisiCalc files and extends the utility of VisiCalc. It runs on Apple II Plus and the IBM PC. It can have up to 15 files, is menu driven, has individual rows and columns, and is not memory dependent. $125 for the Apple II Plus MergeCalc. Cypher, 121 Second St., San Francisco, CA 94105. (415) 974-5297.

CIRCLE 447 ON READER SERVICE CARD

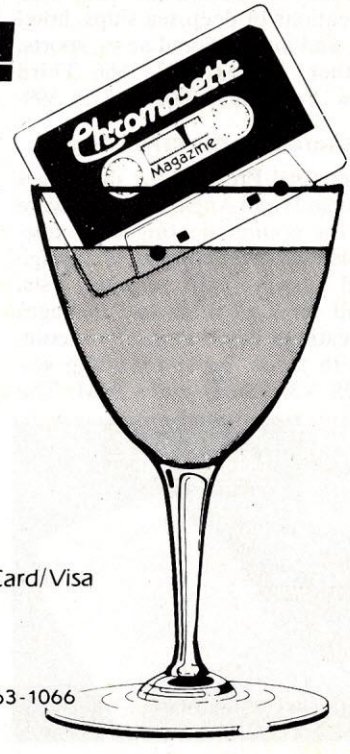
Swift is an interface between WordPro and database packages such as Jinsam, mailing list packages such as Sipper, and other word processors such as Papermate. Swift translates sequential files into WordPro-readable text files. It is designed to run on the Commodore 8032 CBM computer with 8050 disk drives. Ini, Inc., 4013 Chestnut St., Philadelphia, PA 19104. (215) 386-7994.

CIRCLE 448 ON READER SERVICE CARD

Extended BASIC **TRS-80 Color Computer**

The Champagne of Software For a Beer Budget!

Over 75 quality programs a year for under 75¢ each!



Ah, **CHROMASETTE** Magazine, the toast of the holiday season . . . and any season! A subscription to **CHROMASETTE** Magazine consists of 6 to 8 premium programs ON CASSETTE, delivered by First Class Mail to you and your computer every month! Tutorials, utilities, games, and practical programs to usher in a great new computing year!

So, celebrate and get a subscription to **CHROMASETTE** Magazine! Or just take a little sip and try a back issue.

The Bottom Line:

1 year (12 issues)	$45.00	Calif. residents add 6% to single copies.
6 months (6 issues)	$25.00	North America — First Class postage included.
Single Copies	$ 5.00	Overseas — add $10 to subscriptions and $1 to single copies. Sent AO rate.

MasterCard/Visa

The Fine Print:
All issues from July 1981 available — ask for list. Programs are for the Extended BASIC model and occasionally for disks.

Chromasette Magazine P.O. Box 1087 Santa Barbara, CA 93102 (805) 963-1066

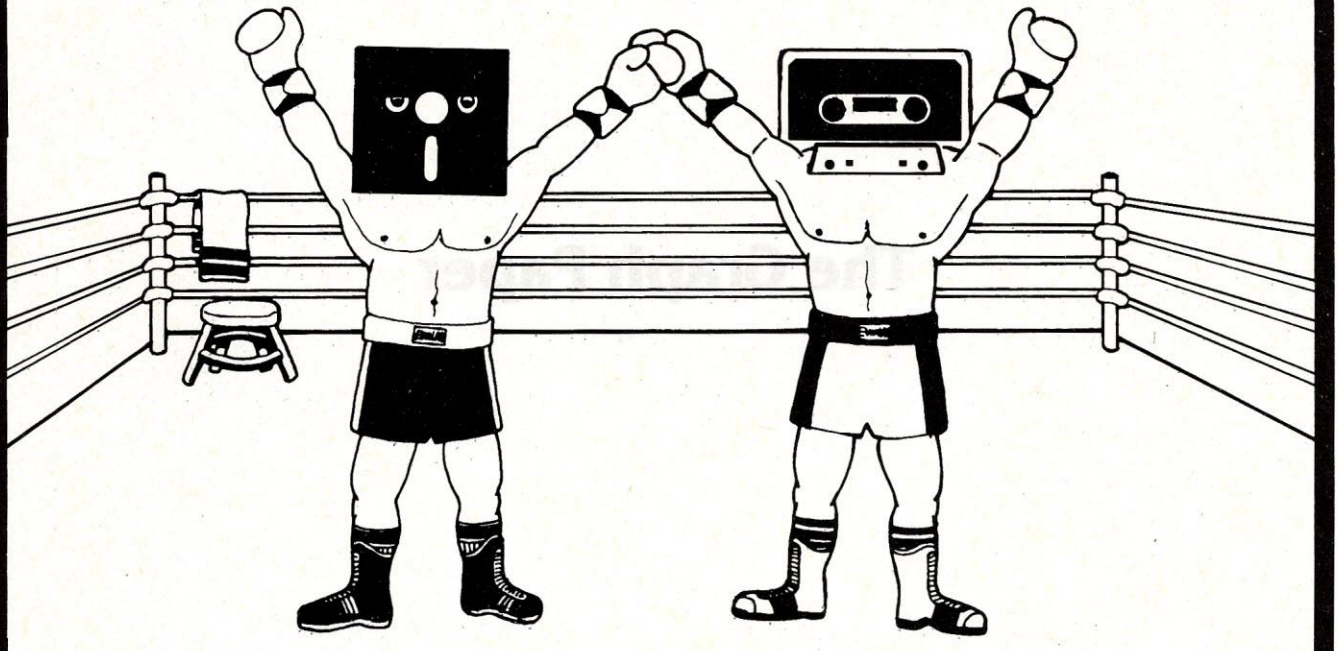
CIRCLE 132 ON READER SERVICE CARD

TRS-80 Model I

And In This Corner, Another Champion.....

TRS-80 Model III

CLOAD'S DISK VERSION!



Get 12 tapes OR disks a year containing over 75 quality programs — without knocking out your budget!

We finally gave in . . . After over FOUR years of publishing some of the best (aren't we pompous), useful and fun programs on tape, we are now offering **CLOAD Magazine on disk,** too!

A subscription to **CLOAD Magazine** (tape or disk) consists of 6 to 8 ready-to-load programs delivered by First Class Mail every month. What a winner!

Fight high software prices — Get a subscription to **CLOAD Magazine.** Or just throw a single punch and try a back issue . . .

The Bottom Line:

	Tape	Disk
1 year (12 issues)	$50.00	$95.00
6 months (6 issues)	$30.00	$55.00
Single Copies		
Back Issues	$ 6.00	$11.00
Good Games #1	$12.00	$23.00
Adventures #1	$13.00	$24.00

California residents add 6% to single copies.
North America — First Class postage included
Overseas — add $10 to subscriptions and $1 to single copies. Sent AO rate.

The Fine Print:
All issues from Oct 78 available on tape. Issues from Oct 82 available on disk, also. Ask for list (24 Level I issues also available).

CLOAD MAGAZINE INC.

(805) 962-6271

P.O. Box 1448
Santa Barbara, CA
93102

MasterCard/Visa

CIRCLE 133 ON READER SERVICE CARD

The Graph Paper

David Lubar

Last month, we covered some methods of screen manipulation and took a preliminary look at character graphics. This time, we'll go deeper into character graphics and cover some other types of screen manipulation, such as scrolling. If you haven't already made a copy of the lookup table listed in the last issue, I'd suggest doing so now, since it will be used extensively from here on.

The question of the month comes from Avis N. Wyatt, Jr., who asks "How can you print on the high resolution screen?" Several methods are discussed below.

The Art of Text

The simple example of character graphics listed last month covered the basic concept of placing a series of bytes on the screen to form an image. The strength of this method is that each image uses little memory and each shape can easily be placed on the screen.

The disadvantage is that minimum horizontal motion is limited to steps of one byte, causing the image to jump seven pixels whenever it moves. While this may seem like a large jump, it works well in some programs. There are actually many programs on the market that move objects two bytes at a time.

If the object is large enough, the result is still smooth animation. Next month, we'll go into smooth, single bit movements. For now, we'll look at various applications of character techniques.

There are two main uses for character graphics. One, as mentioned, and as demonstrated last month, is animation. The other, more crucial application is for placing text on the graphics screen. In the old days, games usually put all text on the bottom four lines, making use of the Apple text window. Nowadays, messages appear all over the place, in various fonts.

Text messages can be broken into two types: dedicated blocks and character sets. A dedicated block is a message that doesn't change, such as the phrase HIGH SCORE. A phrase such as this can be saved as a group of bytes, and then can be placed on the screen wherever it is needed. There is no reason to develop a whole character set for such a message. To do so would be analogous to primitive printing methods where whole words were carved from wood.

Listing 1 shows a general program for placing a message on the screen. To use the routine, just pass the desired coordinates and the routine will place the block of bytes on the screen. See Figure 1 for an example of how the byte pattern for the message was composed. Note that the routine doesn't check for screen boundaries. Since this is an important consideration, I'll take a short sidetrip into the topic now.

Checking For Screen Boundaries

When an object goes past the edge of the screen, it should either disappear or wrap around. Unlike Applesoft shape tables, here the programmer has control of what happens. But if you aren't careful, you can blow your whole program away and hang the system in various nasty manners. The lookup table we use contains a hi byte and lo byte for each line of the screen. But if your program tried to use the table for a location greater than #$BF

YOU CAN MAKE A FORTUNE IN MICROS!

THE MICRO COMPUTER BUSINESS WILL GROW FROM $10 TO $100 BILLION IN THE NEXT EIGHT YEARS! ARE YOU READY TO CASH IN?

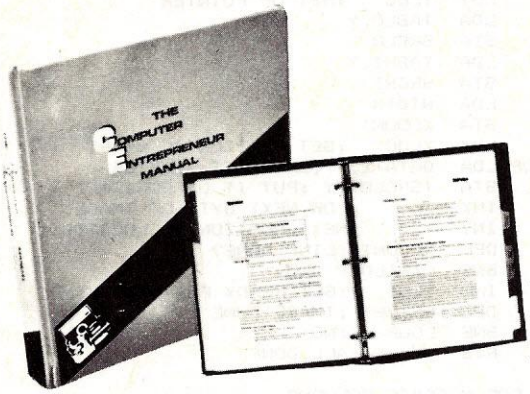
The **micro computer business** is predicted to grow from its present $10 billion to **$100 billion** before 1990! Imagine the possibilities this opens for you! No matter where you live, if you're starting up or presently in business, **no other industry offers you more opportunities!**

Now, finally, all the inside information you need to secure a prosperous future in this dynamic industry is available in **one place - THE COMPUTER ENTREPRENEUR MANUAL!** – An **immense** information source, compiled by our **inquisitive** research team, aided by a panel of **experts** and **business people** from **all areas** of the **computer industry!**

We present the inside story of **more than 100 lucrative computer businesses you can enter,** where you'll find the **real opportunities** for the eighties: from one man operations like **Programming Author, Word Processing Center** or **Consulting,** to **Systems House, Service Bureau, Computer Store etc!** Many at little or no investment! All the invaluable facts and figures: **How to start, Capital needs, Profit estimates and Margins, How to Sell and Market, How missing** technical or business experience **need not stand in your way, Source of Suppliers, etc!** Details that could take **years** to find out on your own!

We'll show you **inside tricks,** like how to **never again pay retail** for computer products and consumer electronics, **even for one item - right now,** while you're starting your business! How to get **free merchandise** and trade show **invitations, etc. This alone** will **more than pay** for the **manual!** You'll read **actual case histories** of other computer entrepreneurs, so you can **learn** from **their mistakes,** and **profit** from their **success stories! Where** you'll be **one year** from now depends on **your actions today!** Let us **show you how** to take the **first crucial steps!**

Order now and take **advantage** of our **limited introduction special, THE COMPUTER ENTREPRENEUR MANUAL,** and a **six month subscription to THE COMPUTER ENTREPRENEUR REPORT/NEWSLETTER** (so you're **always up-to-date** with the industry), **both** for **only** $29.95! **You must** be **convinced** on **how easy** you can **strike it rich** in the micro computer business - or you may **return** the manual for **a full refund** within thirty days! **USE OUR TOLL FREE NUMBER TO ORDER!**



EVERYTHING YOU NEED TO KNOW TO SUCCEED IN THE COMPUTER BUSINESS IS ALL IN THIS MANUAL!

THE COMPUTER ENTREPRENEUR MANUAL has the **answers** to **all your questions** about **selecting, starting** and **succesfully running a computer business!** There has **never** been such a **comprehensive collection** of **know-how** and **information** about this business **in one place! All the facts you need** to **plan** and **acheive your goals** in **easy-to-follow, step-by-step instructions!**

These are some of the **100-plus businesses** covered in **PART ONE** of the manual, with the facts on **How to start and run, Start-up Cost (Even** how to operate **on a shoestring),** What **profits to expect, Wholesale prices, Mark-ups, Suppliers, future outlook, case histories** for **each, etc:**

Systems House, Software Author (who to sell to and who to avoid), **Service Bureau, Software Publisher** (How to find programs that sell, **Word Processing Service, Consulting** and **Consultant Broker** (use your skills or those of others, **make** $150 - $1000 **a day!), The incredible Games Business, Computer Store** (Franchises: Pro and Contra, or a low inventory store **in your home!), OEM, Hardware Mfg, Data base** and **Teletext Service (big prospects!), Used Computers, Repairs, Rent-A-Computer, Promote Fests** and **Trade Shows, Turnkey Systems, Bartering, Mail Order, Compile and rent mailing lists, Specialized Data Headhunting** and **Temp Help Service, Tech Writer Shop, Custom Engineering,** The **highly profitable Seminars** and **Training Business , and many more!**

Many **new ideas** and **ground floor opportunities! Interviews** and **success stories** on **companies** of **all sizes! Privy info on the profits made:** How some **computer store** operators **net** $100 - $250,000! Little known outfits that made their owners **millionaires,** one of these low-key companies, making simple boards, went from **nil to** $20,000,000 and **100 employees** in **four years!** Programmers that make **$300,000, Thousands** of **micro millionaires** in the making, etc!

Whatever your goal is - **Silicon Valley Tycoon,** or just a **business at home - we guarantee** you'll find a **business** to **suit you - or your money back!**

PART TWO of the manual is **loaded** with the **know-how** and **"streetfighting" savvy** you need, both as a **novice** or business **veteran,** to get started, to stay and to **prosper** in the micro computer business! **A goldmine of information** in clear and easy-to-use instructions: How to prepare your **Business Plan, Outside financing,** The **mistakes** you **must avoid,** How to **hire** and **manage employees, Incorporation** (when, and how to do it **cheaply), Surviving bad times, Record Keeping,** how to **estimate your market before you start,** Use **multiple locations** to **maximize profits,** how to **promote** and **stay** steps **ahead of the competition!** How to get **free advertising, free merchandise, free advice, Power negotiating** with suppliers to **double** your **profit margins, etc!** Even how to **keep a present job while starting a business part time!**

Don't miss this opportunity to be part of this **great industry - the next success story** could be **your own! Order the manual today!** Part one and two, bound in **a deluxe ring binder,** where you can also **collect our newsletter (free for six months with the manual - a** $32.50 **value!) - all for only** $29.95!

THE COMPUTER ENTREPRENEUR NEWSLETTER – ALL THE LATEST INSIDE BUSINESS NEWS! NOW! SIX MONTHS FREE WITH YOUR MANUAL!

You're **always attuned** to the industry, and **your manual kept up-to-date,** with our **newsletter!** Each issue has the **latest business news, ideas, new suppliers,** our **indispensible "watchdog" column** on **profits, discounts** (don't miss mfg's promos, like recently, when top video monitor sold at $80 - that's half wholesale, **one third of the retail price!), the competition, the big deals, etc! Feature stories** with start-up info and case histories **on new micro businesses!**

You'll get **invitations** to trade shows and conventions, the **usage** of our **advisory service** and our **discount buying service** for your purchases!

You'll find **many items** in our newsletter that will **save you the cost of your manual many times over!**

CALL TOLL FREE! CHARGE IT!
Credit Card Orders (MC, VISA only) accepted 24 hours/day
1-800-227-3800
Ask for extension 1135
In California call 1-800-792-0990

MasterCard VISA

Order by phone (Credit cards only), or use the coupon:

Mail to **THE COMPUTER ENTREPRENEUR PUBLISHING CO. PO BOX 456, Grand Central Station, New York, N.Y. 10163**

Please send me **THE COMPUTER ENTREPRENEUR MANUAL,** and the **six month free subscription** to **THE COMPUTER ENTREPRENEUR REPORT/NEWSLETTER. All for only** $29.95, plus $3 for postage/handling **(NY residents:** add $2.64 for sales tax). If I decide not to keep the manual, I may **return** it **within 30 days** for **a full refund.**

NAME: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

☐ Check or M.O. enclosed Charge to ☐ VISA ☐ MC

CARD#: _____

Exp. Date: _____

SIGNATURE: _____

B91

© 1982, THE COMPUTER ENTREPRENEUR

CIRCLE 304 ON READER SERVICE CARD

(the last line of the screen), it would produce an address that might be anywhere in memory. It would grab a hi byte from the beginning of the lo byte table, and a lo byte from somewhere past the end of the lo byte table.

If the resulting address were to be used as a pointer, you might end up placing bytes in undesirable areas.

Objects that go past the screen horizontally are not as disastrous, but can be unattractive since they don't wrap smoothly but appear on the next memory location which, as you know, is not the next screen location.

There are two ways to handle these problems. The first is to pad out the lookup table. Since each table is only 192 bytes long, and the 6502 registers can index 256 bytes, the rest of the table can be padded with harmless addresses.

As mentioned last month, there are certain unused portions of the screen, and objects that go past the bottom line can safely be placed in them. If the lo byte table is padded with values of $F8 and the hi byte table padded with $20, shapes that go past the bottom of the screen will be placed in the undisplayed portion of memory starting at $20F8. This works fine as long as the shape occupies no more than eight bytes per line.

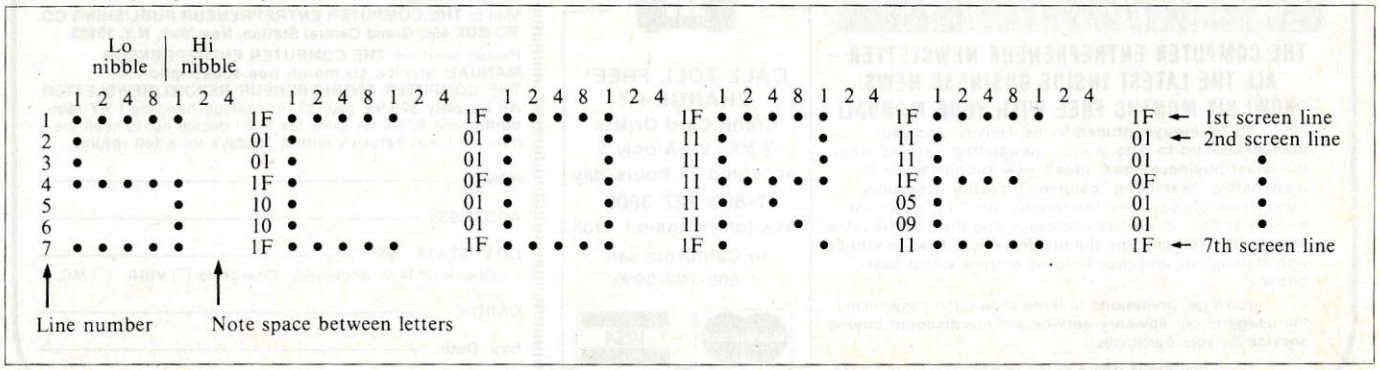
A better method is to check coordinates within your plotting routine. If the vertical coordinate is greater than $BF, nothing is put to the screen. This cuts an object off if it leaves the screen.

To create wraparound, the vertical value is set to $00 when it passes $BF. Horizontal coordinates are treated in a similar manner. You can clip an image by stopping the display when the horizontal location exceeds $27, or create wraparound by allowing the values to cycle. If the horizontal position goes past $27, it becomes $00. If it goes below $00, it becomes $27. In essence, the line is treated in a MOD 27 fashion. We'll explore this in greater depth in later articles.

Listing 1.

```
                        1           ORG  $1000
                        2   * ROUTINE FOR PRINTING
                        3   * MESSAGE BLOCKS.
                        4   * USER MUST PASS DESIRED
                        5   * COORDINATES.
                        6   * LOOKUP TABLE MUST BE
                        7   * APPENDED.
                        8   * MESSAGE STARTS WITH TWO BYTES
                        9   * GIVING HEIGHT AND WIDTH.
                       10   *
                       11   XLOC    EQU  $F8    ;PROVIDED BY USER
                       12   YLOC    EQU  $F9    ;PROVIDED BY USER
                       13   SRCLO   EQU  $FA
                       14   SRCHI   EQU  $FB
                       15   WIDTH   EQU  $FC
                       16   HEIGHT  EQU  $FD
                       17   XCOUNT  EQU  $FE
                       18   TABLO   EQU  $1100  ;SEE LAST ISSUE
                       19   TABHI   EQU  $11C0  ;FOR SCREEN TABLE
                       20   *
                       21   * FIND WIDTH AND HEIGHT
                       22   * OF IMAGE
1000: AD 30 10         23           LDA  DATA
1003: 85 FC            24           STA  WIDTH
1005: AD 31 10         25           LDA  DATA+1
1008: 85 FD            26           STA  HEIGHT
100A: A2 00            27           LDX  #$00   ;X IS USED TO INDEX INTO IMAGE
                       28   *
                       29   * MAIN LOOP FOLLOWS
                       30   *
100C: A4 F9            31   LOOP    LDY  YLOC   ;SET UP POINTER
100E: B9 00 11         32           LDA  TABLO,Y
1011: 85 FA            33           STA  SRCLO
1013: B9 C0 11         34           LDA  TABHI,Y
1016: 85 FB            35           STA  SRCHI
1018: A5 FC            36           LDA  WIDTH
101A: 85 FE            37           STA  XCOUNT
101C: A4 F8            38           LDY  XLOC   ;GET HORIZONTAL START
101E: BD 32 10         39   LINELOOP LDA  DATA+2,X ;SKIP 1ST 2 BYTES
1021: 91 FA            40           STA  (SRCLO),Y ;PUT IT ON SCREEN
1023: E8               41           INX         ;FOR NEXT BYTE OF IMAGE
1024: C8               42           INY         ;NEXT HORIZONTAL LOCATION
1025: C6 FE            43           DEC  XCOUNT ;LINE DONE?
1027: D0 F5            44           BNE  LINELOOP ;NO
1029: E6 F9            45           INC  YLOC   ;GET READY FOR NEXT LINE
102B: C6 FD            46           DEC  HEIGHT ;IMAGE DONE
102D: D0 DD            47           BNE  LOOP   ;NO
102F: 60               48           RTS         ;ALL DONE
                       49   *
                       50   * DATA FOR MESSAGE FOLLOWS
                       51   * LISTED IN SEQUENTIAL ORDER.
                       52   *
1030: 05 07            53   DATA    HEX  0507   ;WIDTH AND HEIGHT
1032: 3F 3F 3F         54           HEX  3F3F3F3F3F ;1ST LINE
1037: 01 01 21         55           HEX  0101212101
103C: 01 01 21         56           HEX  0101212101
1041: 3F 01 21         57           HEX  3F01213F1F
1046: 20 01 21         58           HEX  2001210901
104B: 20 01 21         59           HEX  2001211101
1050: 3F 3F 3F         60           HEX  3F3F3F213F

--- END ASSEMBLY ---

TOTAL ERRORS: 0

85 BYTES GENERATED THIS ASSEMBLY
```

Figure 1. Byte pattern for a message image.



If you own a Timex Sinclair, a ZX81, or any other Sinclair computer, you've probably discovered that the big microcomputer magazines cover only the bigger computers. Where can you find helpful articles on the Sinclair? In *Sync!*

Sync is the one magazine that's written exclusively about Clive Sinclair's marvelous inventions, the Sinclair computers. And it's the one magazine to read if you want to get more from *your* Sinclair.

You'll find program listings for games, helpful programming techniques, hardware upgrades, math and science programs, news of new products for the Sinclair—in short, everything you need to use and enjoy your Sinclair to the fullest.

In just two recent issues, for example, we covered:

- ☐ Putting a Reverse Character in a String
- ☐ How to Double Your Memory
- ☐ Least Squares Data Analysis With the ZX80/81
- ☐ Space Warp: A Graphics Space Game
- ☐ How to Reduce "Blank Screen Time"
- ☐ Storing Three-Letter Words in an Array
- ☐ Software Review: ZX Galaxians
- ☐ An Introduction to Expression Evaluation
- ☐ Short Programs Just for Fun
- ☐ The ZX81 Parser and User-Defined Commands
- ☐ Understanding Floating Point Arithmetic
- ☐ Handling Strings from Another Dimension
- ☐ Book Review: Understanding Your ZX81 ROM
- ☐ How to Add a Keyboard to Your Sinclair
- ☐ Translating Other Basics: DEF on the ZX81
- ☐ Six Outer Space Games—With Program Listings
- ☐ Hardware Review: Sinclair ZX Spectrum High Resolution Color/Sound Computer

If you own a Sinclair microcomputer, *Sync* is the only computer magazine you really need. Subscribe now to *Sync,* and you can save up to 33%! Just complete and return the postage-paid reply card or the coupon at right.

SAVE UP TO 33% ON *SYNC!*

SYNC

CN 1986 · Morristown, NJ 07960

YES! Please send me *Sync* for:

- ☐ One year (6 issues) for $12.97—I save 19%.
- ☐ Two years (12 issues) for $22.97—I save 28%.
- ☐ Three years (18 issues) for $31.97—I save 33%.

Savings based on full 1-year subscription price of $16.

Mr.
Mrs.
Ms._____
(please print full name)

8H03

Address_____Apt.____

City_____

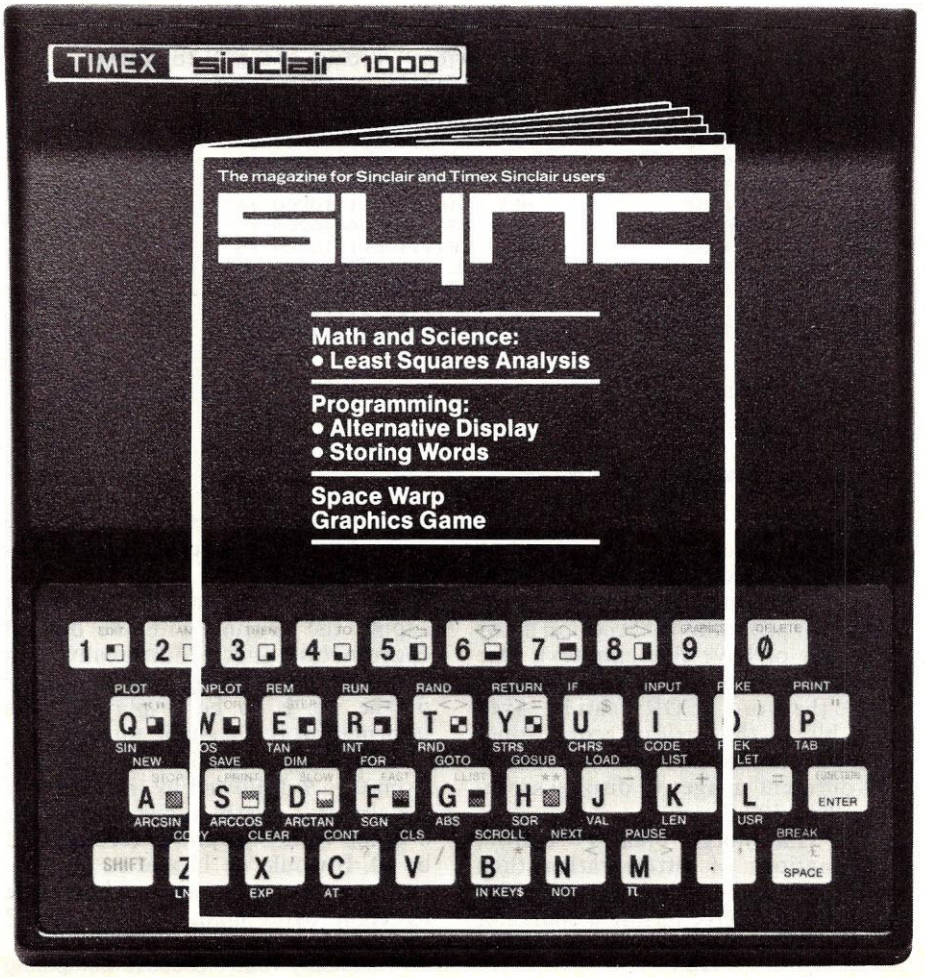
State_____Zip_____

CHECK ONE:

☐ Payment enclosed. ☐ Bill me later.

Offer valid in U.S. and possessions only. Please allow 60 to 90 days for delivery of first issue.

NEW SUBSCRIBERS ONLY

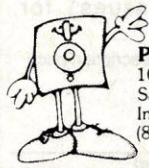


FOR SINCLAIR AND TIMEX SINCLAIR OWNERS ONLY

Maxell Floppy Disks

The Mini-Disks with maximum quality.

Dealer inquiries invited. C.O.D's accepted. Call FREE (800) 235-4137.



PACIFIC EXCHANGES
100 Foothill Blvd., San Luis
San Luis Obispo, CA 93401.
In Cal. call (800) 592-5935 or
(805)543-1037.

CIRCLE 226 ON READER SERVICE CARD

Get Serious About

ZX81

Computing

PROFESSIONAL KEYBOARD. Makes your ZX81 easier to use. Enter programs quickly and error-free. Plugs straight into your ZX81 without any soldering. Has 47 keys and a full space bar. **$85.00**

32K RAM. Expand the memory capacity of your ZX81 with this direct-plug-in module. Fully compatible with Sinclair's 16K RAM (to give your ZX81 system a full 48K). **$99.95**

64K RAM. Expand your ZX81 memory capacity to its maximum. Plugs in directly to your ZX81. **$149.95**

Software on Cassette

MULTIFILE PLUS.
Data storage system for 16K to 64K systems. Flexible, user-defined setup. Includes program tape, detailed instruction manual, 3 data tapes, storage case. **$34.95**

GAMES
MAZOGS
A maze-adventure **$9.95**
INVADERS
10 levels of play **$9.95**
STAR TREK
Zap the Klingons **$9.95**
DICTATOR
Political adventure **$14.95**

Call (716) 874-5510 for Visa, MC Orders.

GLADSTONE Electronics

Mail order to 1585 Kenmore Ave., Buffalo N.Y. 14217
Checks or money orders. No CODs. Add shipping.

CIRCLE 176 ON READER SERVICE CARD

FREE CATALOG!

Just let us know and we'll mail you a FREE *Creative Computing* Catalog – 16 pages filled with books, buyer's guides, magazines, and more!

To get your FREE catalog, write to: *Creative Computing* Catalog, Dept. HB1X 39 East Hanover Ave., Morris Plains, NJ 07950.

Graph Paper, continued...

Listing 2.

```
                        1           ORG  $1300
                        2   * SIMPLE CHARACTER GENERATOR
                        3   * USER MUST PASS COORDINATES
                        4   * AND DESIRED SHAPE NUMBER
                        5   *
                        6   XLOC    EQU  $F8     ;X COORDINATE
                        7   YLOC    EQU  $F9     ;Y COORDINATE
                        8   SHP     EQU  $FA      ;SHAPE NUMBER
                        9   YCOUNT  EQU  $FB
                        10  SRCLO   EQU  $FC
                        11  SRCHI   EQU  $FD
                        12  TABHI   EQU  $1100
                        13  TABLO   EQU  $11C0
                        14  CHRSET  EQU  $7000  ;START OF CHARACTER SET
                        15  *
                        16  * SET UP INDEX TO SHAPE
                        17  *
1300: A5 FA             18          LDA  SHP
1302: 0A                19          ASL         ;MULTIPLY BY EIGHT
1303: 0A                20          ASL
1304: 0A                21          ASL
1305: AA                22          TAX
1306: A9 08             23          LDA  #$08
1308: 85 FB             24          STA  YCOUNT
                        25  *
                        26  * PUT CHARACTER ON SCREEN
                        27  *
130A: A4 F9             28  LOOP    LDY  YLOC
130C: B9 C0 11          29          LDA  TABLO,Y
130F: 85 FC             30          STA  SRCLO
1311: B9 00 11          31          LDA  TABHI,Y
1314: 85 FD             32          STA  SRCHI
1316: A4 F8             33          LDY  XLOC
1318: BD 00 70          34          LDA  CHRSET,X ;GET BYTE OF DESIRED SHAPE
131B: 91 FC             35          STA  (SRCLO),Y ;PUT IT ON THE SCREEN
131D: E8                36          INX
131E: E6 F9             37          INC  YLOC
1320: C6 FB             38          DEC  YCOUNT
1322: D0 E6             39          BNE  LOOP
1324: 60                40          RTS
                        41  *
                        42  * PARTIAL CHARACTER SET
                        43  *
                        44          OBJ  $7000  ;FORCE TABLE INTO MEMORY
1325: 0E 11 11          45          HEX  0E11111111110E00 ;0
132D: 04 06 04          46          HEX  0406040404041F00 ;1
1335: 0F 10 10          47          HEX  0F10100804021F00 ;2
133D: 0F 10 10          48          HEX  0F10100E10100F00 ;3
1345: 09 09 09          49          HEX  0909091F08080800 ;4
134D: 1F 01 01          50          HEX  1F01010F10100F00 ;5
1355: 01 01 01          51          HEX  0101010F11110F00 ;6
135D: 1F 10 08          52          HEX  1F10080804040200 ;7
1365: 0E 11 11          53          HEX  0E11110E11110E00 ;8
136D: 1E 11 11          54          HEX  1E11111E10101000 ;9
1375: 04 0C 11          55          HEX  040C111F11111100 ;A
137D: 0F 11 11          56          HEX  0F11110F11110F00 ;B
1385: 1E 01 01          57          HEX  1E01010101011E00 ;C

--- END ASSEMBLY ---

TOTAL ERRORS: 0

104 BYTES GENERATED THIS ASSEMBLY
```

Character Sets

Getting back to the printing analogy, the fixed message blocks are fine for dedicated uses, but are inefficient for programs that contain many messages or have changing text. One example would be a score display. While the word SCORE can be saved as a block, the various score values cannot. It would be ridiculous to save 100 different images to display scores from 1 to 100.

Just as a linotype creates text from combinations of letters rather than stored words, we can put messages and scores on the screen using a character set. The character set contains all the desired letters and numbers, stored as byte images.

To use such a method, you must supply the routine with the desired coordinates and, additionally, information concerning which member of the set is to be displayed. This information is the shape number.

A set might start off with the digits from 0 to 9, followed by the letters of the alphabet. So the shape number for 0 would be 0, the number for A would be 10, B would be 11 and so on.

If your characters are one byte wide by eight bytes high, you can fit 32

characters into a single page of memory, and need be concerned only with the lo byte of the address of each character. These lo bytes can be either calculated or looked up from a table. In this example, where eight bytes are used for each character, the calculation is simple. Three ASL operations suffice to multiply a number by 8, thus providing the lo byte location.

A partial character display routine is given in Listing 2. I have defined the first few entries of the set, but haven't done the entire alphabet. To show how this routine might be used, Listing 3 contains a program that makes use of Listing 2. The program puts up a six-digit number and increments it.

This sort of program could be used for score keeping and other such functions.

Note the use of the 6502 BCD (Binary Coded Decimal) mode. I have found this to be the easiest method for keeping scores. The BCD mode treats each byte as two decimal digits, limiting each nibble to values from 0-9. Addition and subtraction are handled just as if the nibbles were decimal digits. But increment and decrement instructions still operate as if the digit were normal hex, so be careful.

If you add 01 to 009 in the BCD mode, the result will be 10, but an increment will produce 0A, which is not a valid BCD value. Also, be careful of branches when the decimal mode is set. It is best to clear the mode immediately after using it.

Listing 2 can be thought of as a dedicated routine. Each shape is the same size. But there is no need to restrict characters to one byte in width, nor is there any rule that says all characters must be the same size. Each character can be preceded by two bytes telling how wide and deep it is, allowing character sets with differing sizes. Also, larger characters allow for more creative use of color, a subject we'll look at now.

Colorforms

Small character fonts really can't make much use of color. Since there are only seven plotting bits in a byte, and since each letter should be bordered by blank bits on one side to prevent the text from blurring together, there isn't much room to produce both color and an appealing font.

As mentioned in previous articles, color is produced by plotting every second bit. This can't be done effectively in a small font. But it works out nicely in larger displays, as evidenced by the colorful large fonts found in many games.

If you create a large font and place

Listing 3.

```
                                1           ORG  $1000
                                2   * SAMPLE PROGRAM THAT
                                3   * USES CHARACTER SUBROUTINE
                                4   *
                                5   XSTART   EQU  $10
                                6   DIGNUMB  EQU  $11
                                7   DIG1     EQU  $12
                                8   DIG2     EQU  $13
                                9   DIG3     EQU  $14
                               10   XLOC     EQU  $F8
                               11   YLOC     EQU  $F9
                               12   SHP      EQU  $FA
                               13   TEMPLO   EQU  $FB
                               14   TEMPHI   EQU  $FC
                               15   DRAWCHAR EQU  $1300
                               16   *
                               17   * CLEAR SCREEN
                               18   *
1000: A9 20                    19           LDA  #$20
1002: 85 FC                    20           STA  TEMPHI
1004: AA                       21           TAX
1005: A9 00                    22           LDA  #$00
1007: 85 FB                    23           STA  TEMPLO
1009: A8                       24           TAY
100A: 91 FB                    25   CLRLOOP STA  (TEMPLO),Y
100C: C8                       26           INY
100D: D0 FB                    27           BNE  CLRLOOP
100F: E6 FC                    28           INC  TEMPHI
1011: CA                       29           DEX
1012: 10 F6                    30           BPL  CLRLOOP
1014: 8D 50 C0                 31           STA  $C050
1017: 8D 52 C0                 32           STA  $C052
101A: 8D 54 C0                 33           STA  $C054
101D: 8D 57 C0                 34           STA  $C057
1020: 85 12                    35           STA  DIG1    ;INITIALIZE SCORE TO 0
1022: 85 13                    36           STA  DIG2
1024: 85 14                    37           STA  DIG3
                               38   *
                               39   * LOOP TO INCREASE AND DISPLAY SCORE
                               40   *
                               41   * GET DIGITS STARTING WITH HIGHEST
                               42   *
1026: A9 02                    43   MAINLOOP LDA  #$02
1028: 85 11                    44           STA  DIGNUMB
102A: A9 11                    45           LDA  #$11
102C: 85 10                    46           STA  XSTART
102E: A6 11                    47   DIGLOOP  LDX  DIGNUMB
1030: B5 12                    48           LDA  DIG1,X
1032: 4A                       49           LSR          ;SHIFT DOWN HI NIBBLE
1033: 4A                       50           LSR
1034: 4A                       51           LSR
1035: 4A                       52           LSR
1036: 85 FA                    53           STA  SHP
1038: A5 10                    54           LDA  XSTART
103A: 85 F8                    55           STA  XLOC
103C: A9 00                    56           LDA  #$00
103E: 85 F9                    57           STA  YLOC
1040: 20 00 13                 58           JSR  DRAWCHAR
1043: E6 10                    59           INC  XSTART ;MOVE TO NEXT POSITION
1045: A6 11                    60           LDX  DIGNUMB
1047: B5 12                    61           LDA  DIG1,X
1049: 29 0F                    62           AND  #$0F    ;GET LO NIBBLE
104B: 85 FA                    63           STA  SHP
104D: A5 10                    64           LDA  XSTART
104F: 85 F8                    65           STA  XLOC
1051: A9 00                    66           LDA  #$00
1053: 85 F9                    67           STA  YLOC
1055: 20 00 13                 68           JSR  DRAWCHAR
1058: E6 10                    69           INC  XSTART
105A: C6 11                    70           DEC  DIGNUMB
105C: 10 D0                    71           BPL  DIGLOOP
                               72   *
                               73   * INCREASE SCORE
                               74   *
105E: F8                       75           SED          ;USE BCD MODE
105F: A5 12                    76           LDA  DIG1
1061: 18                       77           CLC
1062: 69 01                    78           ADC  #$01
1064: 85 12                    79           STA  DIG1
1066: A5 13                    80           LDA  DIG2
1068: 69 00                    81           ADC  #$00
106A: 85 13                    82           STA  DIG2
106C: A5 14                    83           LDA  DIG3
106E: 69 00                    84           ADC  #$00
1070: 85 14                    85           STA  DIG3
1072: D8                       86           CLD          ;DECIMAL MODE MUST BE CLEARED
1073: AD 00 C0                 87           LDA  $C000   ;CHECK FOR KEYPRESS
1076: 10 AE                    88           BPL  MAINLOOP
1078: 2C 10 C0                 89           BIT  $C010
107B: 60                       90           RTS
```

it on the screen, you may find that the letters alternate in color, since an image started on an odd byte will be a different color than the same pattern started on an even byte. There are several ways around this problem.

One fairly painless but limiting solution is to make each image an even number of bytes wide. Thus, if a message is started on an odd byte, each succeeding letters will also start on an odd byte. Figure 2 shows an image for a letter that is two bytes wide and a single color. Note how the hi bit is skipped and how the set bits are designed to maintain color.

Other methods of dealing with color involve color masks and shifting. A color mask is simply a byte pattern that turns off undesired bits. The first step would be to create a white image by setting sequential bits in the shape.

Now suppose you want only the odd bits to be set. You would make two masks, one with only even bits set ($2A), the other with odd bits set ($55 ignoring the hi bit).

Now, when a byte is placed on an even byte, it is ANDed with the even mask value $2A. This turns off all the bits occuring on even locations. When the byte is to be placed on an odd position, it is ANDed with the $55 mask. As a result, only bits occurring on odd positions will be displayed (see Figure 3).

Fortunately, it is very easy to determine whether a coordinate is odd or even. Just take the horizontal value and perform the LSR operation. If the carry is set, the number is odd.

Rotation can be used to change or control the color of an image. Let's say you have a character set defined with internal color by skipping every other bit. As mentioned, it will have one color when a character is started on odd bytes, and another color when started on even bytes.

But suppose you want to maintain color. The solution is to rotate each byte before putting it on the screen. Assume the color you desire is the one produced when the byte starts at an odd location. To produce the same color on even locations, each byte is rotated before being placed on the screen.

The problem with this method is that bits that rotate out of one byte must be placed in the next byte. If all eight bits of a byte were used for plotting, this would be a simple operation, since the carry would pass on such bits, but the hi bit of the Apple gets in the way, complicating the process. In general, the masking method is quicker and simpler.

One other alternative, when space is

Listing 4.

```
                        1           ORG  $1000
                        2   * PROGRAM TO SCROLL THE
                        3   * SCREEN VERTICALLY.
                        4   * USES A LOOKUP TABLE.
                        5   *
                        6   SRCLO    EQU  $F8
                        7   SRCHI    EQU  $F9
                        8   DESTLO   EQU  $FA
                        9   DESTHI   EQU  $FB
                        10  LINE     EQU  $FC
                        11  TABHI    EQU  $1100
                        12  TABLO    EQU  $11C0
                        13  *
1000: 8D 50 C0          14          STA  $C050
1003: 8D 52 C0          15          STA  $C052
1006: 8D 54 C0          16          STA  $C054
1009: 8D 57 C0          17          STA  $C057
100C: A2 BF             18  SCROLL  LDX  #$BF
100E: BD C0 11          19  LOOP1   LDA  TABLO,X
1011: 85 FA             20          STA  DESTLO
1013: BD 00 11          21          LDA  TABHI,X
1016: 85 FB             22          STA  DESTHI
1018: CA                23          DEX
1019: BD C0 11          24          LDA  TABLO,X
101C: 85 F8             25          STA  SRCLO
101E: BD 00 11          26          LDA  TABHI,X
1021: 85 F9             27          STA  SRCHI
1023: A0 27             28          LDY  #$27   ;40 BYTES PER LINE
1025: B1 F8             29  LOOP2   LDA  (SRCLO),Y
1027: 91 FA             30          STA  (DESTLO),Y
1029: 88                31          DEY
102A: 10 F9             32          BPL  LOOP2
102C: E0 00             33          CPX  #$00
102E: D0 DE             34          BNE  LOOP1
                        35  *
                        36  * SCROLL DONE. NOW HAVE TO
                        37  * BLANK OUT TOP LINE.
                        38  *
1030: A9 00             39          LDA  #$00
1032: A0 27             40          LDY  #$27
1034: 91 F8             41  LOOP3   STA  (SRCLO),Y ;STILL POINTING TO TOP LINE
1036: 88                42          DEY
1037: 10 FB             43          BPL  LOOP3
                        44  *
                        45  * CHECK FOR KEYPRESS
                        46  *
1039: AD 00 C0          47          LDA  $C000
103C: 10 CE             48          BPL  SCROLL
103E: 2C 10 C0          49          BIT  $C010
1041: 60                50          RTS

--- END ASSEMBLY ---

TOTAL ERRORS: 0

66 BYTES GENERATED THIS ASSEMBLY
```

Figure 2. 2 byte wide colored letter. Note use of alternating (circled) bits.

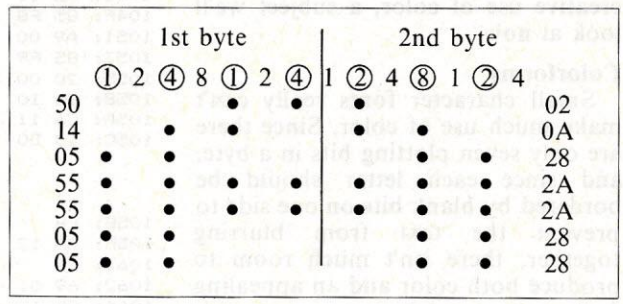
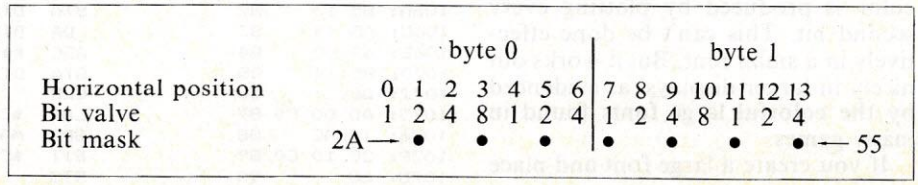


Figure 3. Bit masks for displaying odd bits.



Get MORE out of VISICALC With

V-UTILITY $99.95

COPYRIGHT © 1981 YUCAIPA SOFTWARE Version 5.0

SPECIFY COMPUTER MODEL

NOW AVAILABLE FOR IBM PERSONAL COMPUTER (PC DOS)
APPLE II (DOS 3.2 and DOS 3.3)
TRS-80 MOD I, II, III and 16 (TRSDOS)

V-UTILITY CONSISTS OF ALL THESE VISICALC "USER FRIENDLY" UTILITY PROGRAMS ON ONE DISK RUN BY INDEX AND PROMPTS.

V-PRINT SELECT FROM 1 TO 16 COLUMNS AND PRINT THEM IN ANY ORDER. YOU MAY SPECIFY THE PRINT WIDTH OF EACH OF THE COLUMNS INDIVIDUALLY AND SELECT SPACES BETWEEN THE COLUMNS.

V-STAT PROGRAM COLLECTS DATA AUTOMATICALLY FROM THE VISICALC COLUMN AND CALCULATES NUMERICAL DISTRIBUTION, CORRELATION COEFFICIENT, REGRESSION ANALYSIS, CHI² TEST, AND T-TEST. YOU MAY SELECT THE COLUMNS FOR DATA ENTRY AND SPECIFY THE ROW# TO START AND ROW TO END DATA COLLECTION. PROGRAM IS EASY TO RUN.

V-PLOT THIS PROGRAM AUTOMATICALLY INPUTS DATA FROM A VISICALC COLUMN, PERFORMS AUTO SCALING THEN PLOTS EITHER 1 OR 2 COLUMNS ON A REGULAR LINE PRINTER (GRAPHICS NOT REQUIRED). IDEAL FOR ANALYZING UP TO 250 NUMERICAL DATA POINTS IN RELATION TO TIME.

V-OVERLAY PROVIDES THE FOLLOWING SELECTION OF OVERLAYS TO LOAD ON TO THE VISICALC SHEET. MOVING AVERAGES, EXPOTENTIAL SMOOTHING EQUATIONS, TIME SERIES TREND ANALYSIS, DATE COLUMNS.

YUCAIPA SOFTWARE

12343 12TH ST · YUCAIPA·CA·92399

PHONE (714) 797-6331 SHIPPING & COD $3.00

IBM, APPLE, TRS-80, and VISICALC are trademarks respectively of International Business Machines Corp, Apple Computer Inc, Tandy Corp, and VisiCorp

CIRCLE 287 ON READER SERVICE CARD

Our Name Means a Great Deal

COMPATIBLE Accessories

APPLE & FRANKLIN COMPATIBLE

FRANKLIN ACE 1000

- Apple II Compatible
- 64K RAM User memory
- Upper and lower case
- Typewriter style keyboard
- Twelve key numeric pad
- Alpha lock shift key
- VisiCalc friendly
- 50 watt power supply
- Built in Fan

Please call or write for more details.

COMPATIBLE HARDWARE

Thunderclock clock/calendar	119.00
ALF 9 Voice Music Card	149.00
16K Rambrd by ConComp kit frm	50.00
16K Rambrd by ConComp assem	69.00
Hayes Micromodem II	269.00
Grappler Parallel Graphics I/F	129.00
Mountain Comp. Music System	299.00
CPS Multi-Function Card	169.00
Microsoft Z-80 SoftCard	279.00
Novation Apple Cat Modem	289.00
TG Products Joysticks	49.00
Videx 80 Column Videoterm	239.00
Videx Keyboard Enhancer II	119.00
Vista Vision 80 Column Board	255.00

COMPATIBLE DISK DRIVES

MICRO-SCI A2 Drive w/contr	429.00
MICRO-SCI A2 Add-on Drive	369.00
FORTH Disk Drive w/contr	469.00
FORTH Add-on Disk Drive	339.00
RANA Disk Drive w/contr	499.00
RANA Add-on Disk Drive	679.00

COMPATIBLE SOFTWARE

HowardSoft Tax Preparer	119.00
WordStar by MicroPro	339.00
PFS (Personal Filing System)	95.00
DB Master by Stoneware	169.00
ScreenWriter II by On-Line	99.00
VisiCalc	185.00
VisiTrend/Plot	225.00
VisiFile	185.00

WE CARRY THE "TOP 100" TITLES. PLEASE CALL FOR MORE DETAILS.

IBM® COMPATIBLE ACCESSORIES

64K memory card by Microsoft	299.00
128K memory card by Microsoft	429.00
256K memory card by Microsoft	649.00
Combo Card by Apparat	235.00
Joystick for IBM PC	55.00
Baby Blue Z-80 w/64K & CP/M	CALL
Percom mini-flop add-on dr	CALL
Tandon TM 100 mini-flop dr	CALL
WordStar by MicroPro	339.00
VisiCalc (standard)	159.00
VisiCalc (Extended Version)	CALL

Send for our catalog with over 200 items for the IBM PC Computer at great prices.

ATARI

ATARI 800 Computer w/48K	669.00
ATARI 810 Disk Drive	429.00
ATARI 410 Recorder	75.00
ATARI 850 Interface Module	169.00
Pac-Man	33.00
Star Raiders	34.00
Centipede	34.00
Missile Comm	29.00
Joystick Controllers (pair)	20.00

Much more for ATARI, Please Call

MONITORS

AMDEK Video 300 12" Hi-res Gr	159.00
AMDEK Color I 13" Color w/aud	349.00
AMDEK Color II Hi-res RGB	729.00
AMDEK APPLE II dvm rgb card	159.00
NEC 12" Hi-res Gr w/aud	169.00
NEC 12" composite color w/aud	339.00
NEC 12" Hi-res RGB Color	769.00
SANYO 9" Green Monitor	169.00
SANYO 12" Gr & 13" color	CALL
TAXAN Vision I 12" RGB 380L	389.00
TAXAN Vision II 12" RGB 380L	CALL
TAXAN Vision III 12" RGB 630L	CALL
ZENITH 12" Green Monitor	119.00

NEW!
WINTER CATALOG/PRICE LIST
OVER 1000 ITEMS
SEND $1.00, CREDITED TO YOUR FIRST ORDER

VIC-20

The Friendly Computer

$195

VIC 1540 Disk Drive	339.00
Datasette Cassette	65.00
VIC 1515 Graphic Printer	329.00
8K RAM Cartridge	49.00
16K RAM Cartridge	89.00
VIC Super Expander	54.00

CALL FOR INFO ON MORE VIC SOFTWARE FROM COMMODORE AND UNITED MICROWARE.

commodore

We carry a complete line of Commodore 64 Computer accessories, software and add-ons. Please call or write for details.

PRINTERS

C. ITOH F-10 CPS (parallel)	1349.00
C. ITOH F-10 CPS (serial)	1399.00
C. ITOH Prowriter 8510 (parallel)	459.00
C. ITOH Prowriter 8510 (serial)	579.00
C. ITOH Prowriter II's	Please Call
EPSON MX-80 F/T Type III grps	539.00
EPSON MX-100 Type II grps	679.00
IDS Prism Printers	Please Call
NEC 8023 Dot Matrix & grps	479.00
OKIDATA 82A w/tractor	469.00
OKIDATA 83's and 84's	Please Call
Smith Corona Printer	639.00

NEC

PC-8001 32K Computer

We carry all the hardware offered for the NEC PC including RenTec, and many software packages from MicroPro and Peachtree. PLEASE CALL FOR PRICES.

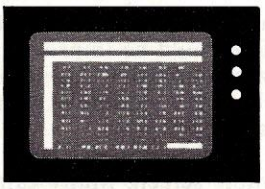
consumer computers

Toll Free 800-854-6654
Info & California 619 698-8088

MAIL ORDER *catalog sales*
8338 Center Drive
La Mesa, CA 92041

We accept most major credit card, bank wires, money orders, cashiers or certified checks and personal checks (10 days to clear). For shipping, handling and insurance add 3% if prepaid with a check and 5% if paid by credit card (min. $5.00). UPS Blue label air service is shipped F.O.B. CA residents add 6% sales tax. Foreign customers please call or write for ordering info. All equipment is subject to price change and availability. All equipment is new and complete with manufacturer's warranty. Send $1.00 for Catalog/Price List, credited to your next purchase. We have a 15-day satisfaction or return policy — call or write for details.

CIRCLE 148 ON READER SERVICE CARD



LEARN VISICALC™ THE EASY WAY USING OUR TEMPLATES

First load Visicalc, then load the Template diskette and key in the numbers. You will enjoy the power of Visicalc *instantly!*

DO YOUR:

ESTIMATING in CONSTRUCTION Job Cost $49.95

The Building Site • Preliminary Costs • Site Clearing, Excavation, & Fill • Footings • Foundation • Floor System • Super Structure • Roofing • Electrical, Plumbing, Heating & Air Conditioning • Brickwork • Energy Saving Materials • Interior Wall & Ceiling Finish • Exterior Trim • Concrete Floors, Walks, & Terrace • Interior Trim • Painting, Floor Covering & Appliances • Gutters, Onsite Improvements & Misc. • Overhead Contingency & Profit.

★ ★ ★

ANALYSIS in FINANCE $49.95

Break-Even Analysis • Cash Budget • Pro-Forma P & L • Pro-Forma Balance Sheet * Ratio Analysis • Depreciation Tables (5) • Net Present Values.

★ ★ ★

PROJECTIONS in REAL ESTATE $49.95

NIREB Forms: CID B — Property Analysis • CID C — Comparative Investment Analysis • CID D — Individual Tax Analysis • CID G — Excess Depreciation • Net Proceeds • CID I-A — Internal Rate of Return.

★ ★ ★

BUDGETS for the HOME $29.95

Personal Budget • Shopping List • Mortgage & Loan • Individual Retirement Account • IRS Schedule A.

★ ★ ★

Future Templates — Retailing • Energy Audit • Engineering • Statistics • Multi-Level Marketing. Customize Templates $30.

★ ★ ★

Specify which one: Apple II • TRS-80 I, II, III • IBM PC • Atari 400, 800 • Commodore

★ ★ ★

ORDERS ONLY ..... **(800) 525-9391 EXT. 533**
INQUIRIES ..... **(714) 338-5075**
COD — Cashiers Check or Money Order Only. Prepaid — Personal Check O.K.
UPS — Add $2.50 shipping or handling, street address required. Calif. — add 6.5% sales tax.

SOFTWARE MODELS

"The Template People"
P.O. Box 1029 • Crestline, CA 92325

CIRCLE 264 ON READER SERVICE CARD

COMPUTERS:

PERSONAL & BUSINESS

PRINTERS:

LETTER QUALITY & MATRIX

MONITORS:

GREEN PHOSPHOR & COLOR

SOFTWARE:

IBM, APPLE, ATARI, CP/M

BOOKS & SUPPLIES

COMPUTERTIME, INC.

P.O. BOX 216
KENTFIELD, CA. 94914
800-227-2520 TOLL FREE
IN CALIF. CALL
(415) 459-8082

CIRCLE 144 ON READER SERVICE CARD

no problem, would be to have two separate fonts — one with the odd bits set, the other with even bits set. In general, this approach isn't worth the space.

I am indebted to Ernie Brock, author of *Pascal Graphics Editor,* for providing me with a wealth of information on character graphics and color control.

Ups and Downs

Scrolling is just a specialized form of byte manipulation. To make the screen scroll down, the bytes in the next to last line are moved to the last line, the bytes from the third from last line are moved to the next to last line, and so on. If required, new data is brought in to fill the vacated top line.

A downward scroll must start at the bottom and work up. If the procedure started at the top, the result would be duplication of the top line all the way down. First, the top line would be moved to the second line, then the second line (which contains the same values as the top line) would be moved to the third line, and so on.

To demonstrate the process, Listing 4 contains a short program that scrolls the whole screen downward. After each move, the top line is replaced with $00, so the end result is a blank screen. To scroll horizontally, the same basic technique is used, but rather than move each line up or down, each byte within a line is moved over.

Because of the odd/even color problem on the Apple, a scroll of one byte will produce an image that alternates between colors with each move.

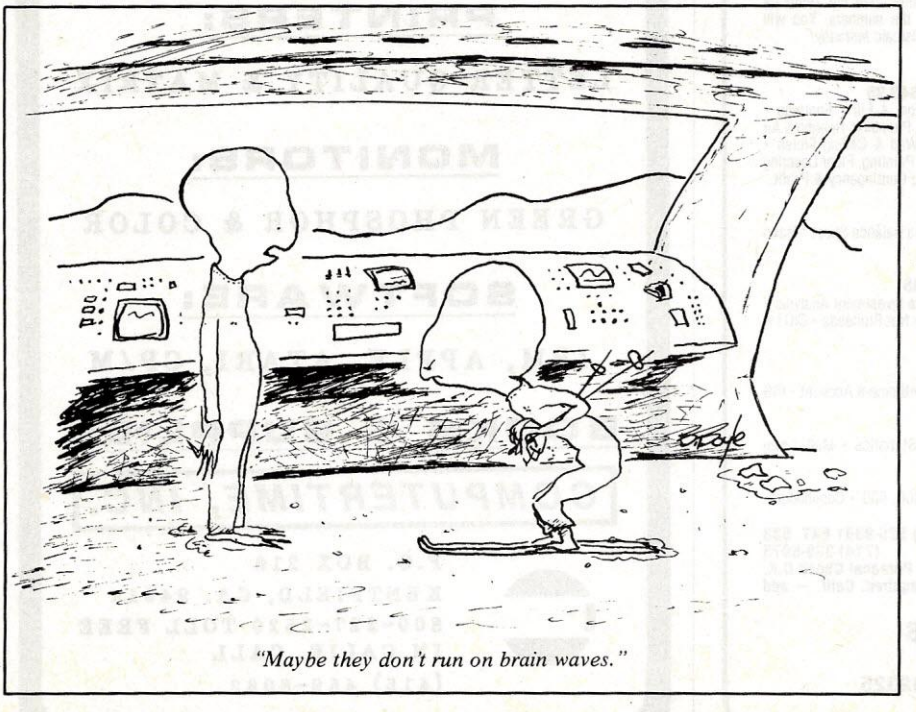
Listing 5 shows a program that scrolls the screen horizontally. In this case, the byte that moves off the edge is replaced on the other side. Note that execution time could be improved by using separate source and destination pointers rather than manipulating the register so much.

In many cases, you won't want to scroll the whole screen. Many games have a small area scrolling across the bottom. In such cases, where the scene being scrolled is larger than the screen, an image of the area is kept elsewhere in memory. For each screen line, there is a data line containing the full landscape image for that screen line. In this way, a varying landscape can be scrolled across the screen. A variable is kept pointing to the portion of the data which is currently the start of a screen line. To scroll the image, the pointer is changed, and the bytes for each line are taken from the data and put to the screen.

You may have noticed that the full-screen scroll is not very fast. When speed is required, there is another method available, using dedicated code. Rather than use indirect indexing, this method contains a sequence that specifies each memory location in the scrolling sequence. The advantage of such a method is high speed. The problem is that the code is

Listing 5.

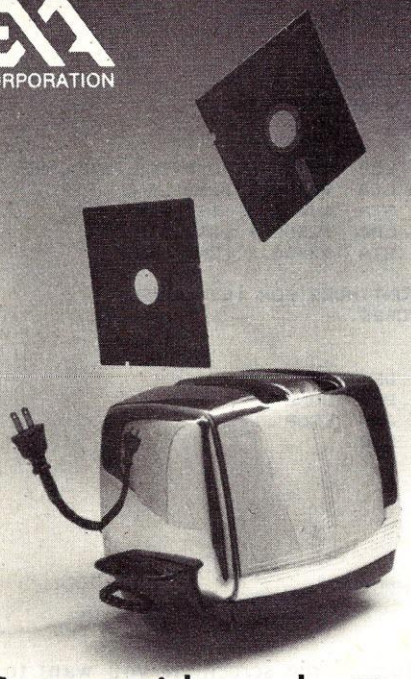
```
:ASM

                        1           ORG  $1000
                        2   SRCLO   EQU  $F8
                        3   SRCHI   EQU  $F9
                        4   TABHI   EQU  $1100
                        5   TABLO   EQU  $11C0
                        6   * HORIZONTAL SCROLLING
                        7   *
1000: 8D 50 C0          8           STA  $C050
1003: 8D 52 C0          9           STA  $C052
1006: 8D 54 C0         10           STA  $C054
1009: 8D 57 C0         11           STA  $C057
100C: A2 00            12   SCROLL  LDX  #$00   ;192 LINES
100E: BD C0 11         13   LOOP1   LDA  TABLO,X
1011: 85 F8            14           STA  SRCLO
1013: BD 00 11         15           LDA  TABHI,X
1016: 85 F9            16           STA  SRCHI
1018: A0 27            17           LDY  #$27
101A: B1 F8            18           LDA  (SRCLO),Y ;SAVE END OF LINE
101C: 48               19           PHA
101D: 88               20   LOOP2   DEY
101E: B1 F8            21           LDA  (SRCLO),Y
1020: C8               22           INY
1021: 91 F8            23           STA  (SRCLO),Y
1023: 88               24           DEY
1024: D0 F7            25           BNE  LOOP2
1026: 68               26           PLA       ;RESTORE END BYTE
1027: 91 F8            27           STA  (SRCLO),Y
1029: E8               28           INX
102A: E0 C0            29           CPX  #$C0
102C: D0 E0            30           BNE  LOOP1
102E: AD 00 C0         31           LDA  $C000
1031: 10 D9            32           BPL  SCROLL
1033: 2C 10 C0         33           BIT  $C010
1036: 60               34           RTS

--- END ASSEMBLY ---

TOTAL ERRORS: 0

55 BYTES GENERATED THIS ASSEMBLY
```



"Maybe they don't run on brain waves."

NEXA

NEXA CORPORATION



"Great without butter !"

Start your day with the most exciting game you've ever played.

NEXA's dynamic **Captain Cosmo** gives you the chance to save the world and be a real super hero. 'Zap' the treacherous Munchies with Sominizer rays, outmaneuver Devious Dan, outsmart Spacey Stacey and her Transport beam, and even outfly the grumpy Munchies before they eat you alive. Experience all this excitement enhanced with hi-res-graphics, scrolling screens, and ear tingling sound effects. Easy to learn, yet difficult to master.
(Atari 400/800 w/32K)

NEXA CORPORATION P.O. Box 26468 San Francisco CA 94126-6468 (415) 387-5800

CIRCLE 217 ON READER SERVICE CARD

Everything you always wanted to do with Visicalc™, (but thought you couldn't).

VERSACALC
VERSACALC
VERSACALC
VERSACALC
VERSACALC
VERSACALC
VERSACALC
VERSACALC

If you use Visicalc™ but are bumping into its limitations, you need Versacalc™! Versacalc runs within Visicalc but uses no extra memory; in fact, it effectively increases memory by letting you call in modules from disk as needed.

A Tutorial section makes clear such features as @LOOKUP, DIF, @NA, @ERROR, which are not well explained in the Visicalc manual.

A Utilities section makes it easy to create your own menu-driven modules which condense hundreds of commands into four keystrokes. You can build in sophisticated error checking (e.g. Is the input value between certain limits?). Now it is possible for people untrained in Visicalc to perform the weekly updating without constant instruction.

YES! We said, "SORT VISICALC!"

Apple II $100.00
Commodore $125.00
IBM and Apple /// $150.00

Dealer inquiries invited.

Versacalc is a trademark of Versacalc Ent
Visicalc is a trademark of Visico p. Inc

Anthro-Digital, Inc.
103 Bartlett Avenue
Pittsfield, MA 01201
413-448-8278

- SORT a Visicalc screen on any column, ascending or descending; all related formulas and labels are sorted too.
- put the entire disk CATALOG on the screen at once!
- easily do Year-To-Date accumulations!
- "pound" formulas to expose the full formulas in place on the screen!
- append two Visicalc files!
- print the contents of a /SS file!
- print the contents of a /PF file!
- AND our EASEL BINDER is so nice that you will put your other manual in it!

CIRCLE 110 ON READER SERVICE CARD

DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?

Pat. #4,259,705

ISO-1

ISO-2

Don't Blame The Software!

Power Line Spikes, Surges & Hash could be the culprit! Floppies, printers, memory & processor often interact! Our patented ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash. MONEY BACK GUARANTEE!

- **ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket $69.95**
- **ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank $69.95**
- **SUPER ISOLATOR (ISO-3) similar to ISO-1 except double isolation & Suppression $104.95**
- **SUPER ISOLATOR (ISO-11) similar to ISO-2 except double isolation & Suppression $104.95**
- **MAGNUM ISOLATOR (ISO-17) 4 Quad Isolated sockets; For ULTRA-SENSITIVE Systems $181.95**
- **CIRCUIT BREAKER, any model (Add-CB) ..... Add $9.00**
- **REMOTE SWITCH, any model (Add-RS) ..... Add $16.00**

AT YOUR DEALERS

MasterCard, Visa, American Express
ORDER TOLL FREE 1-800-225-4876
(except AK, HI, PR & Canada)

ESP Electronic Specialists, Inc.
171 South Main Street, Box 389, Natick, Mass. 01760
(617) 655-1532

CIRCLE 167 ON READER SERVICE CARD

ORBYTE™ SOFTWARE
AND YOUR
TIMEX/SINCLAIR 1000
...the perfect match!

ALSO COMPATABLE WITH SINCLAIR ZX81

MAGIC GRAPHICS Fun for the novice and a must for the sophisticated programmer. Draws in 8 directions, lifts & moves drawing point, redraws your graphic, gives all coordinates to any graphic you create and moves your graphic to any new position on the screen. 16K **$14.95**

WORDS Exciting fun and education for all ages. A six category spelling game that creates high motivation through positive reinforcement. Great entertainment for one or many players. 16K **$14.95**

SALVO A strategic battle of the high seas. Your opponents ships are hidden. Your mission is to destroy the enemy ships before they can launch an attack on your fleet. 16K **$14.95**

ORBYTE™ SOFTWARE
THE CREATIVE FORCE™

Send check or money order to:
ORBYTE SOFTWARE
P.O. Box 948, Dept. CC
Waterbury, CT 06720
203-753-8308

NAME _____

ADDRESS _____

CITY & STATE _____ ZIP _____

☐ GRAPHICS ☐ WORDS ☐ SALVO ☐ FREE catalogue

Connecticut residents ad 7½% sales tax.

CIRCLE 225 ON READER SERVICE CARD

Graph Paper, continued...

rather long. For a full screen, the code would contain 192 loads and 192 stores. A segment of such a routine is shown in Listing 6. In general, this type of dedicated code should be used whenever speed is essential.

Code of Many Colors

We have already seen how the six basic colors are obtained on the Apple. Alternating dots produce color, sequential dots produce white, and an absense of dots results in black. But many other colors can be produced on the Apple by combining colors.

For instance, suppose you turn on every fourth pixel of a line. If you repeate the process on the next line, the result would be alternating colored and black vertical stripes. This, however, is not an interesting blend.

But suppose the lines were staggered. The first line starts on bit 0 and sets every fourth pixel. The next line starts with bit 2 and again sets every fourth pixel. The third line begins at 0, the fourth line at 2 and so on. Now, the colors blend to produce a darker shade of the original color.

This is the general method for obtaining those "extra" colors. Such patterns can be stored as a series of bytes, then be moved to the screen, or be ANDed with the screen, to produce colorful effects.

For instance, the pattern described above would be $11, $22, $44, $08, repeated to fill the first line. Then, for the second line, the sequence would be $44, $08, $11, $22, etc. If you want to fill an area, you just store the bytes to the screen. If you want to color an object, you AND it with the color bytes.

That's about all that will fit this month. Next time, we'll get into full animation with pre-shifted shapes. We'll cover the various methods being used in arcade games. □

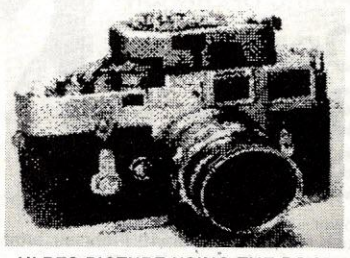
Listing 6.

```
:ASM
                        1     * SAMPLE PORTION OF
                        2     * A DEDICATED SCROLLING
                        3     * ROUTINE
                        4     *
7000: A0 27             5     START     LDY  #$27   ;40 BYTES PER LINE
7002: B9 00 24          6     LOOP      LDA  $2400,Y ;2ND LINE
7005: 99 00 20          7               STA  $2000,Y ;1ST LINE
7008: B9 00 28          8               LDA  $2800,Y ;3RD LINE
700B: 99 00 24          9               STA  $2400,Y ;2ND LINE
                        10    *
                        11    * THIS CONTINUES FOR 192 LOADS
                        12    * AND STORES.
                        13    *
                        14    *
700E: 88                15              DEY
700F: 30 03             16              BMI  DONE
7011: 4C 02 70          17              JMP  LOOP
7014: 60                18    DONE      RTS


--- END ASSEMBLY ---

TOTAL ERRORS: 0

21 BYTES GENERATED THIS ASSEMBLY
```

LET YOUR APPLE SEE THE WORLD!

The DS-65 Digisector® opens up a whole new world for your Apple II. Your computer can now be a part of the action, taking pictures to amuse your friends, watching your house while you're away, taking computer portraits . . . the applications abound! The DS-65 is a random access video digitizer. It converts a TV camera's output into digital information your computer can process. The DS-65 features:

- **High Resolution** — a 256 × 256 picture element scan
- **Precision** — 64 levels of grey scale
- **Versatility** — Accepts either NTSC or industrial video input
- **Economy** — A professional tool priced for the hobbyist



HI-RES PICTURE USING THE DS-65 AND PICTURE SCANNER SOFTWARE

The DS-65 is an intelligent peripheral card with on-board software in 2708 EPROM. Check these software features:

- Full screen scans directly to Apple Hi-Res screen
- Easy random access digitizing by Basic programs
- Line-scan digitizing for reading charts or tracking objects
- Utility functions for clearing and copying the Hi-Res screen

Use the DS-65 for precision security systems; computer portraiture; robotics; fast to slow scan conversion; moving target indicators; reading UPC codes, musical scores and paper tape and more! **GIVE YOUR APPLE THE GIFT OF SIGHT!** DS-65 Price: $349.95 / FSII Camera Price: $299.00 / Combination Price: $599.00

ADDITIONAL SOFTWARE FOR THE DS-65

—Picture Scanner: Provides a variety of different dithering algorithms for compressing the digitized image into the Hi-Res screen. Available on 13-sector disk. Price: $39.95

—Superscan: Enables you to enhance the DS-65's Hi-Res pictures with colors! Choose from 21 different colors and assign them to grey scale values, modify pictures, zoom, enhance contrast, etc. Print routines for the Anadex and Paper Tiger* are provided. Comes on a 13-sector disk. Written for The Micro Works by Magna Soft. Price: $79.95

—Portrait System Software: This program includes captions and a credit line, reverse printing for T-shirt application and the option to save portraits on disk. Specifically for use with a Malibu 165 printer. Call or write for more information.

*Paper Tiger is a trademark of Integral Data Systems, Inc.

THE MICRO WORKS

MasterCharge/Visa Accepted

P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

CIRCLE 212 ON READER SERVICE CARD

Micro Power Bench™

- Single Switch Control of CPU and Peripherals
- Built in circuit breaker protects your system
- Four power expansion outlets
- Choice of high quality oak or walnut
- Compatible with IBM, APPLE, TRS-80 and others

SAVE! SAVE! ONLY $79.00

Order Direct
800-343-4311
Master Charge and Visa Accepted

CAB-TEK, Inc.
Riverside St., Nashua NH 03062
CIVILIZING COMPUTERS
MX 80
ACOUSTIC ENCLOSURE $99!

DEALER INQUIRIES INVITED

CIRCLE 119 ON READER SERVICE CARD

NEW! For the Apple 48K . . .

PSYCHOLOGICAL

DIARY

Including . . .

- Diary Keeper
- Dream Interpreter
- Personality/Relationship Testing
- Super-sophisticated ELIZA, programmed by psychotherapists using techniques from contemporary therapeutic schools
- Diary locked by user-supplied password
- Diary Search feature for user indexing
- Diary entries saved on disk, printed on printer
- Machine language for fast running
- For personal growth and self-exploration only; not a substitue for professional psychotherapy

$39.95 *Ohio residents add $2.60 sales tax*

PSYCHOLOGICAL SYSTEMS
1519 Burlington Road - Cleveland Heights, OH 44118

CIRCLE 239 ON READER SERVICE CARD

Finally . . . a name disk for a no name price! Available direct to you from I/O Management Corporation.

DATAPRO™ is an outstanding flexible disk manufactured with a flakeproof oxide coating burnished to prevent drive head maintenance and insure data integrity. Each disk is critically tested Read/Write 100% error free of bit drop in/drop out and after 12 million passes still retains accurate original output.

DATAPRO™ is unsurpassed for high durability and low abrassiveness. QH-equipped with reinforced hub rings. consistent with all industrial magnetic media.

Make all your input/output computing professional. Go with the pros.

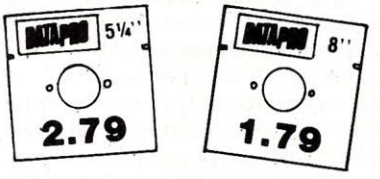
GO DATAPRO™

DATAPRO™

Flexible Disks

Division of I/O Management Corporation
463 Station Avenue. S. Yarmouth. MA 02664
IN MASS.: 1-617-322-0453
NATIONWIDE: 1-800-343-1292

Dealers welcome



Introductory offer.
Order 10 Pack or 5 Pack

In Mass.: 1-617-322-0453
Nationwide: 1-800-343-1292

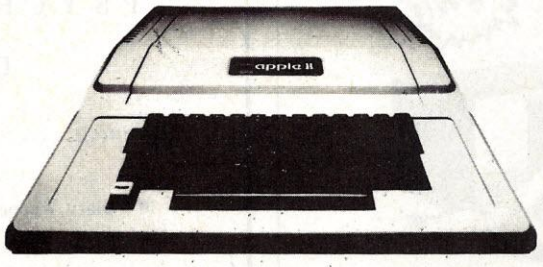
☐Check (to Datapro™) ☐Money Order
☐M.C. ☐Visa Exp._____
#_____
Computer _____ Hard Sector / Soft Sector
Name _____
Address _____
City_____ State_____ Zip_____
Phone _____

	# of 5¼" 5 pack	# of 5¼" 10 pack	# of 8" 10 pack	
SS/SD	9.95☐	17.90☐	27.90☐	____
SS/DD	13.45☐	21.90☐	29.99☐	____
DS/DD	19.95☐	34.90☐	39.99☐	____
DS/DD FLip Flop	17.45☐	29.90☐		____

Library case (holds 10) 2.50 ____
Retail Software Pkg. (1) 1.25 ____
UPS/Shp. & Handl. 2.00
5% Sales Tax (in Mass.) ____
Total ____

Please no C.O.D. or purchase orders.

CIRCLE 188 ON READER SERVICE CARD



e cart...apple cart...apple

Michael Coffey

Earlier this year, we received many letters because a game program we published contained a bug. The problem involved an incorrect method of reading the Apple II keyboard. Most of the letters contained incorrect fixes for the bug. Maybe we should take a look at the problem.

We want to write a program that does not hang around waiting for keyboard input but that uses keyboard input whenever it becomes available. The Apple can tell us whether or not a key has been pressed recently if we cooperate.

One memory location is set aside to hold the last key pressed. Another is reserved for the program to tell the hardware that the last key has been read. The first location is also used by the hardware to tell the programmer that there is a new key to read.

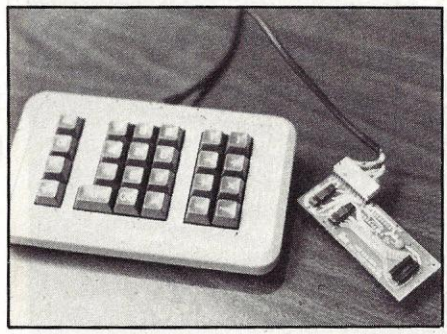
Our strategy is to read that first location frequently to see if a new key has been pressed. When a new key is ready, we must do two things: save the key value in another location and tell the hardware that we have read the key.

In Basic, we use the PEEK function to learn whether a key is available. If the value of PEEK(−16384) is greater than 127, a key has been pressed. We will use the variable KD, short for key data, to denote this address.

When a key is ready, the function PEEK(−16384) yields the ASCII code for the key. The CHR$ function turns an ASCII code into a single-character string. We will assign the character string to the variable K$.

Once we have determined K$, we must clear the keyboard so that more keystrokes can be recorded. We POKE a value into location −16368 — any value. We use KC to stand for the address used for keyboard clearance.

Listing 1 is a program that reads the keyboard and maintains a special cursor on the screen. The program will keep the latest character in K$, call subroutine 2000 whenever a key is pressed, and call subroutine 3000 on each loop where no key is pressed.



Numeric Keypad.

Subroutine 2000 simply displays the new value of K$. Subroutine 3000 displays an underline cursor and backs up one space. If you remove the backspace function (CHR$(8)), you will get an idea of how many times the loop runs between keypresses.

The program works for all literal keys, but some control keys can make the screen look strange. The main loop is a good starting point for any keyboard processing program. The subroutines should be adapted for your specific purposes.

Incidentally, the technique of repeatedly checking a keyboard or other input device is called polling. You now know how to do polled keyboard input. Congratulations.

Repeaterrr

Speaking of keys, we recently received a small board that converts an Apple keyboard into one with automatic repeat on all the keys except Reset. The Repeaterrr, though hard to spell, is easy to use.

When you hold down a key, it will repeat itself to the Apple. You can adjust the length of time the key waits before repeating. If you make the period very short, you will end up with keybounce. If you make it very long, guest typists will never notice your modification. We like to make it just long enough to avoid accidental repeats.

Besides the autorepeat feature, you get a fast repeat feature. Just press the repeat key and the key will repeat itself much faster than usual. Your software will hardly be able to keep up with the keyboard in fast repeat mode.

The board must be sandwiched between the keyboard and the keyboard encoder board. Consequently the bottom of the computer must be unscrewed and removed. Apples with old style keyboards can not use this modification.

The Repeaterrr comes with very explicit instructions and is a good buy at $24.95.

Numeric Keypad

This hardware add-on is dedicated to VisiCalc users everywhere. Anyone else who types many numbers can key along. Numbers and related symbols can be produced with the keypad from The Keyboard Company.

7 Good reasons why you should subscribe to *Creative Computing.*

It's the Number One magazine of computer applications and software!

There's one place you can always be sure of learning more about microcomputer software and applications: *Creative Computing.*

Every month *Creative Computing* provides you with a continuing education on everything related to microcomputers and computer equipment. Useful articles, "how to" tutorials, exciting new applications, games and "no holds barred" reviews of the latest software and equipment make up a major part of *Creative Computing*'s editorial content.

We give you probing features on programming breakthroughs and important news. Plus in-depth articles on elementary, intermediate and advanced software and applications topics—to help you develop your knowledge and skills, save hundreds (perhaps thousands) of dollars in unneeded software, discover uses for your personal computer that you might never have considered. Articles that increase your overall "computer consciousness." Here's how:

1 *Creative Computing* gives you things to actually do with a computer.

Just owning a computer isn't enough. You've got to know what to do with it. That's why applications are our primary focus. Text editing, animation, graphics, business simulations, data base and file systems, music synthesis, control of household devices, communications, games—some of the applications and software you'll learn about in *Creative Computing.*

2 *Creative Computing* discusses business applications in simple, nontechnical language.

If you're a business person who needs to know about the latest developments in word processing and office applications, turn to *Creative Computing.* We clarify such business applications as investment analysis, futures evaluations, data base management, mailing list programs, text editing, word processing and simulations. And all the software available for business people.

3 *Creative Computing* helps you decide which computer equipment is best for you.

Our tough, no-nonsense equipment profiles arm you with the facts before you walk into a computer store. You'll know the right questions to ask and how to cut through the jargon and sales hype. We give you authoritative guidance in deciding what you need, what you don't need—and what's right for you and your pocketbook.

4 *Creative Computing* covers computer education in depth.

We started out as a computer education publication, and we're still committed to the educational community. We regularly carry articles on designing educational software, evaluating educational software, teaching concepts and terminology in computer education, text editing applications for literature and computer simulations in the classroom—plus a great deal more.

5 *Creative Computing* brings you hours of mind-expanding game entertainment.

We've got a soft spot for the computer game addict—and computer game software. We know you want to understand more about the new computer games flooding the market: which ones are easiest to learn? Require the most skill? Offer the most surprises? Give you the best graphics? Provide the most challenge? Contain a new twist? *Creative Computing* brings you the answers.

6 *Creative Computing* features the state of the art.

Columns on the most popular personal computers, a "software legal forum," letters to the editor. Reviews of books, games, organizations, dealers and events. Fascinating interviews with leading innovators, equipment designers, program developers and game inventors—men and women who'll give you a real glimpse of the future!

7 Our price is right.

By subscribing to *Creative Computing* now, you can save as much as 33% off the full subscription price. To learn elsewhere what you'll learn from *Creative Computing*, you might spend hundreds of dollars in course fees and books. Then you'd have to winnow out what you could use from all that you'd learned. But *Creative Computing* does that for you, so you'll have time to enjoy your own computing interests. And that saving of time makes this offer very inexpensive indeed.

Join over 150,000 *Creative Computing* readers by subscribing today! Just use the coupon at right.

SAVE UP TO 33%!

Creative Computing · P.O. Box 5214 · Boulder, Colorado 80322

YES! Send me *Creative Computing* for:

- ☐ One year (12 issues) for $19.97—I save 20%!
- ☐ Two years (24 issues) for $36.97—I save 26%!
- ☐ Three years (36 issues) for $49.97—I save 33%!

Savings based on full one-year subscription price of $24.97.

Check one: ☐ Payment enclosed. ☐ Bill me later. 4S093

Mr. / Mrs. / Ms. _____
(please print full name)

Address _____ Apt. _____

City _____

State _____ Zip _____

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue.

APPLE • ALTOS • ATARI • MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • ADDS

HP • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • GTE • DIABLO • BMC • CENTRONIC • NEC • HAZELTINE • MEMOREX • AMPEX • PERSONAL SOFTWARE • ADDS • XEROX • DIABLO

BMC • CENTRONIC • NEC • HAZELTINE • AMPEX • VERBATIM • HITACHI • HAYDEN • CANON • NOVATION • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • PERSONAL SOFTWARE • GTE

MICRO

BUSINESS WORLD INC.
Information Line (213) 996-2252
TOLL FREE MAIL ORDER LINES
(800) 423-5886 Outside Calif.

LE MONITOR

9" GRN PHS	12" GRN PHS
MSL 189.00	MSL 189.00
OUR PRICE 88.00	OUR PRICE 119.00
Save $101.00	Save $70.00

METAL CABINET

SPECIAL OF THE MONTH GRAPHICS

Add a Genie in Your Computer Intelligent Printer Interface Card

Works With
- Integer Basic
- Applesoft*
- Pascal 1.0 & 1.1
- CP/M**

*Applesoft is a registered Trademark of Apple Computer, Inc.
**CP/M is a registered trademark of Digital Research.

OUR PRICE $119.00
MSL 159.00
Save 40.00

MICRO-SCI

APPLE II+ COMPATIBLE DRIVE

W/ CONTROLLER		W/O CONTROLLER	
MSL 549.00	OUR PRICE 429.00	MSL 449.00	OUR PRICE 379.00
Save 216.00	COMPARE TO APPLE DRIVE	Save 146.00	COMPARE TO APPLE DRIVE

APPLE IS A REG. TRADE MARK OF APPLE COMPUTER

IBM PERSONAL COMPUTER

INCLUDES:
2 Drives DS/DD
Color Graphic Board
64K Memory
12" BMC GRN PHS

MSL 3305.00 OUR PRICE $2895.00 Save 410.00
*Subject to availability

APPLE II PLUS 48K

*Subject to availability

MSL 1530.00 OUR PRICE $1095.00 Save 435.00
APPLE IS A REG. TRADEMARK OF APPLE COMPUTER

THE APPLE COMPATIBLE ALTERNATIVE

FRANKLIN BUSINESS SYSTEM

Franklin Ace 1000 system • 64K • Disk Drive with controller card • 12" green phs. video monitor.
Color optional $49.00

$1695.00
SAVE $1000 COMPARED TO APPLE SYSTEM

OSBORNE PERSONAL COMPUTER

INCLUDES SOFTWARE

- CPM
- MAIL MERGE
- WORDSTAR
- CB BASIC
- SUPERCALC
- M BASIC

MSL 1795.00 OUR PRICE 1595.00 Save $200.00

NEC STUDENT SYSTEM 64K

*NEC PC 8001
*NEC PC 8012
*NEC PC 8031
12" Grn. Phs. Video Monitor

MSL 2839.00 OUR PRICE $2095.00 Save 744.00

RADIO SHACK TRS 80 MOD III

48K
2 DRIVE

MSL 2495.00 OUR PRICE $1733.00 Save 762.00

commodore STUDENT SYSTEM

4032 - 32K 40 COL CRT
4940 - DUAL DISK DRIVE

MSL 2590.00 OUR PRICE $1978.00 Save 612.00

APPLE ACCESSORIES

	MSL	Our Price
Prometheus Versacard	$ 295.00	$ 209.00
CPS Multi Function Card	235.00	105.00
Videx Video Term 80 Column Card	349.00	239.00
Videx Keyboard Enhancer (orig)	99.00	74.00
Videx Keyboard Enhancer II	149.00	119.00
Z-80 Softcard by Microsoft	395.00	277.00
16K Ramcard by Microsoft	195.00	149.00
Thunderclock/Calendar Card	149.00	109.00
Smartmodem 80 Column Card	349.00	277.00
Corvus Winchester 5MB Disk	3195.00	2900.00
Corvus Winchester 10MB Disk	4995.00	4250.00
Corvus Winchester 20MB Disk	5995.00	5100.00
ALF 3 Voice Music Card	249.00	177.00
ALF 9 Voice Music Card	195.00	145.00
Joysticks By Keyboard Co	65.00	44.00
2 3 Key Numeric Keypad by	149.00	112.00
Music System (16 voices) Mntn	395.00	288.00
A/D+D/A Interface by Mountain	349.00	267.00
Expansion Chassis (8 slots)	449.00	365.00
C Lock/Calendar Card by Mountn	280.00	219.00
Supertalker SD-200 by Mountain	195.00	145.00
Romplus + Card	175.00	119.00
Romwriter Card	195.00	137.00
Ramplus 32K Ram Add-On(w/16k)	195.00	137.00
Sup-R-Fan	65.00	45.00
Sup-R-Terminal 80 Column Card	395.00	288.00
Versawriter Digitizer Tablet	349.00	245.00
A Sychronous Serial Card by CCS	175.00	135.00
Centronics Parallel Card by CCS	135.00	109.00
Grappler Printer Interfaces	175.00	135.00
SVA 2+2 Sgl. Den 8" Disk Cont		
SVA ZVX4 Megabyter 8" Disk Cont		
Apple Cache 256K By SVA		
IEEE-488 Interface by SSM	495.00	377.00

APPLE SOFTWARE

	MSL	Our Price
Visicalc Apple Dos 3.3	$ 250.00	$ 180.00
Visidex	250.00	180.00
Visiplot	200.00	150.00
Visiterm	125.00	75.00
Visitrend	260.00	197.00
Visifile	250.00	180.00
Desktop Plan II	250.00	180.00
Desktop Plan III	200.00	149.00
Visipack	750.00	588.00

IBM PERSONAL COMPUTER PERIPHERALS & SOFTWARE

HARDWARE	MSL	Our Price
CORVUS Hard Disk 5MB	$3195.00	$2795.00
Microsoft		
64K Ram Card	399.00	369.00
128K Ram Card	599.00	475.00
256K Ram Card	995.00	777.00
64K Ram chips	195.00	155.00
Quadram		
Quad Ram 256K,4function brd	995.00	675.00
TG Products		
Joystick	65.00	47.00

SOFTWARE		
Automated Sim. Temple of Apshai	35.00	28.00
Cavalier Championship Blackjacks	35.00	28.00
Continental Home Accountant Plus	149.00	109.00
Denver Easy (Exec.Accounting Sys.)	695.00	535.00
Infocom Deadline	35.00	27.00
Innovative T.I.M. III (a DBMS)	450.00	355.00
ISM Mathmagic	75.00	65.00
Info Unlimited		
Easy writer II	350.00	269.00
Phone Support of Easywriter II	350.00	260.00
Easyspeller (88K words)	150.00	119.00
Easyfiler (aDBMS)	400.00	289.00
Micro Pro Wordstar	495.00	229.00
Sorcim Superwriter	395.00	289.00
Super Calc	295.00	210.00
Visicorp Visicalc	200.00	155.00
Visicalc/256K	250.00	189.00
Desktop Plan I	300.00	240.00
VisiTrend/Plot	300.00	240.00
VisiDex	250.00	199.00
VisiFile	250.00	199.00
VersaWriter Graphics Tablet	299.00	255.00
Conquest	29.95	24.00
Frogger	34.95	29.00
The Tax Manager	250.00	199.00
Galaxy	25.00	21.00
Midway Campaign	21.00	17.95
Computer Stocks and Bonds	25.00	21.00
Voyager	25.00	21.00
Draw Poker	21.00	17.95
Lost Colony	21.95	23.95

MONITORS

BMC	List	Our Price
12" Grn. Phs KQ (15 Hz)	219.00	165.00
12" Grn. Phs EO (18 Hz)	$249.00	185.00
12" Grn Phs (20 Hz)	279.00	209.00
12" Colour Compusite Hi Res.	439.00	319.00
Grn. Phs 12"	275.00	165.00
NEC Grn. Phs. 12"	225.00	179.00
Zenith 12"	159.00	119.00

HEWLETT PACKARD

HP-11C Slim-Line Advanced	135.00	119.00
HP 12C Slim-Line Financial	150.00	129.00
HP-41 CV New 2.2 Bytes Mem	325.00	250.00
HP-41-C Calculator	250.00	185.00
Card Reader For 41CV/C	215.00	162.00
Printer For 41CV/C	385.00	289.00
Optical Wand For 41 CV/C	125.00	97.00
Quad Ram Equals 4 Mem. Mods	95.00	81.00
Memory Modules For 41C		25.00
HP-97 Programble Printer	750.00	595.00
HP-67 Programble Calculator	375.00	295.00
HP-34C Programble Scientific	150.00	117.00
HP-38C Programble Bus. R/E	150.00	117.00
HP-32E Adv. Scientific	55.00	48.00
HP-37E Business Mgmt.	75.00	57.00

MONITORS

NEC

Nec 12" Hi Res Green Monitor	210.00	165.00
Nec 12" Composite Color Monitor	449.00	345.00

SANYO

Sanyo 9" B & W	225.00	165.00
Sanyo 9" Green Monitor	225.00	169.00
Sanyo 12" B & W	275.00	185.00
Sanyo 12" Green (New Case Style)	320.00	249.00
Sanyo 13" Color Monitor	489.00	359.00

ZENITH

Zenith 12" Green Monitor	159.00	119.00

PRINTERS

EPSON	MSL	Our Price
Epson MX-80 T Type III w/graphics	645.00	429.00
Epson MX-80F/T Type III w/graphics	745.00	525.00
Epson MX-100 Type III w/graphics	995.00	669.00

OKIDATA		
Okidata 82A w/tractor 80 col	649.00	457.00
Okidata 83A W/tractor 132 col	995.00	719.00
Okidata 84A 132 col. serial	1495.00	1177.00
Okidata 84A 132 col. parallel	1395.00	1019.00

C. ITOH		
C. Itoh F 10 40 cps (parallel)	1795.00	1377.00
C. Itoh F 10 40 cps (serial)		1439.00
C. Itoh Prowriter (parallel)	695.00	519.00
C. Itoh Prowriter (serial)	749.00	565.00

DRIVES

5¼" FLOPPY DISK DRIVES

		MSL	Our Price
For the IBM Personal Tandon TM 100-1	Single-Sided 48TP1	$295.00	$239.00
For IBM/Northstar/Cromemco Tandon TM100-2	Dual-sided. 48TP1	395.00	319.00

5¼" WINCHESTER DRIVES

Seagate ST 506	6.38Mb	1500.00	1179.00
Seagate ST 412	12.76Mb	1750.00	1275.00
Tandon TM 602	6.4Mb	1395.00	1079.00
Tandon TM 603	9.6Mb	1500.00	1179.00

WE RESERVE THE RIGHT TO CORRECT TYPOGRAPHICAL ERRORS.
THIS AD SUPERCEDES ALL PREVIOUS ADS.

MICRO MAIL ORDER
20929 Ventura Blvd.
Woodland Hills, Ca. 91364
Telex: 182852
Answer: MICKO TZNA

OUTSIDE CA CALL TOLL FREE 1 (800) 423-5886 IN CA (213) 996-2252

Name (Please print) _____
Address _____
City _____ State _____ Zip _____

Qty	Make	Model	Description	Price	Total

TOTAL ORDER $ _____
TAX IF APPLICABLE* _____
SHIPPING & HANDLING** _____
TOTAL ENCLOSED $ _____

*California residents add 6% sales tax.
**Add 3% Shipping & Handling — Add 3% surcharge for credit cards. Orders cannot be shipped unless accompanied by payment, including shipping, handling and tax where applicable.

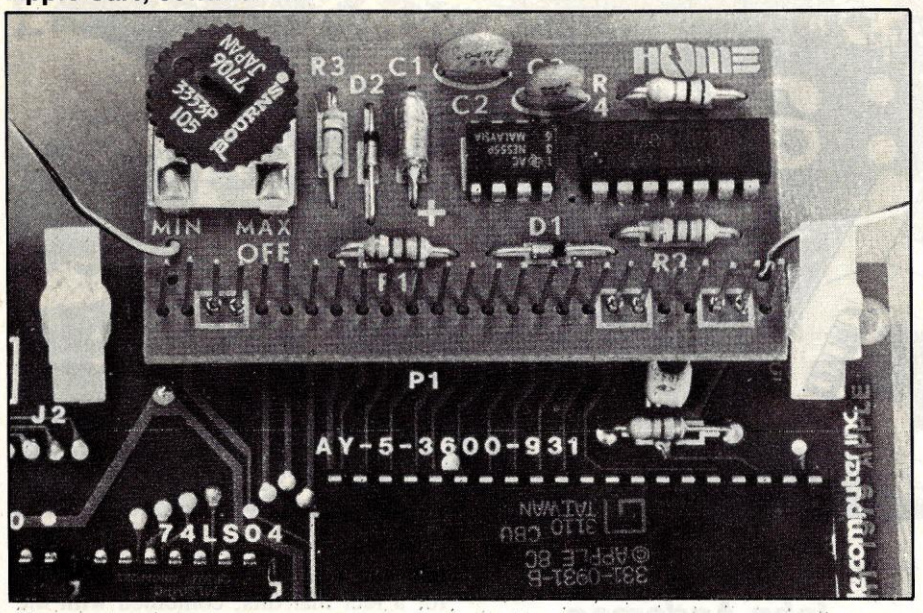
☐ Certified Check or M.O. ☐ Allow 2 weeks clearance for personal check
☐ Bank Wire Transfer

VISA MasterCard

CREDIT CARD'# _____
Exp. Date _____ Signature _____

MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • PERSONAL SOFTWARE • CCS

CIRCLE 202 ON READER SERVICE CARD



Repeaterrr.

The keypad is easy to install if you don't mind pulling the computer apart. First, you must remove the bottom plate of the Apple, carefully unplugging the standard keyboard. Next, plug the new keypad into the motherboard and plug the standard keyboard connector into a new circuit board that comes with the numeric keypad. Replace the bottom plate and you are ready to compute again.

The 5′ cable should be threaded through one of the slots in the back of the Apple. A molded fitting on the cable prevents it from being yanked out of the computer by accident. The unit measures 8.25″ × 5″ × 1.5″ and weighs only a few ounces.

The Numeric Keypad provides a slightly more distinct feedback than the standard keyboard, has bumps on two of the keys to aid in positioning your fingers, and is otherwise similar to the Apple keyboard.

The 24 keys are arranged in three groups. The central group includes the digits 0-9, the decimal point, and a 00 key. To the left of the digits is a group of VisiCalc editing keys including ESC, both arrows, and a space bar equivalent.

To the right of the digits The Keyboard Company has mounted a return key, both parentheses, and the numeric operations −, /, +, and *. The last key on the lower right is labeled PRINT and produces a question mark when pressed. See Figure 1 for a more precise layout of the keys.

As far as we can tell, the keypad interferes in no way with the operation of any Apple II software. The advantages are obvious and well worth the price to anyone who spends more than a few hours a week typing numbers.

Magic Keyboard

One of the wildest keyboard modifications we have seen comes from Southern California Research Group. Magic Keyboard enables you to rearrange the keys on your keyboard. If you want to study keyboard layout technology and psychology, this one is for you.

This 2.5″ × 3″ board must be planted in the keyboard socket on the Apple motherboard. The cable from the keyboard can then be plugged into the Magic board. This means that you have to remove the bottom plate from your Apple again.

Before putting things back together, you must make a few choices. You can choose an alternate alphabetic layout and a numeric layout. The instructions detail the available options. Dvorak standard, left hand only, right hand only, and other layouts are all built in.

After installing, you will be able to shift between regular QWERTY layout and the preselected alternate layout with the flick of a switch. The press of a button will shift you between the alphabetic and numeric layouts. The switch and the button are both mounted on a little pad that can be stuck to the Apple or any other convenient surface.

We tried the Dvorak layout and found that we did not have enough time to learn it. As workers that are forced to use many different keyboards, we can't see any payoff for us in learning a new one at the moment. I encourage layout experimentation and hope for the day when all keyboards are programmable. □

Listing 1.

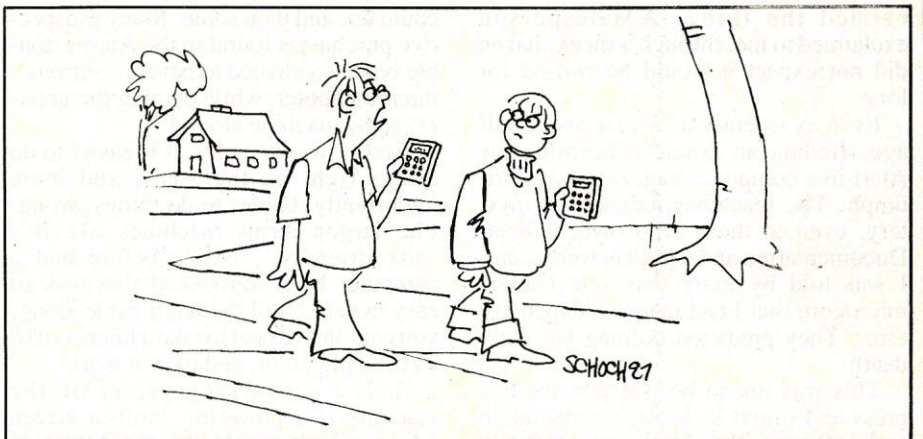
```
100 KC = -16368
110 KD = -16384
120 K$ = ""

1000 IF PEEK(KD) > 127 THEN K$ =
       CHR$( PEEK(KD) ): POKE KC,0:
       GOSUB 2000: GOTO 1100
1010 GOSUB 3000
1100 REM COME FROM 1000
1110 GOTO 1000

2000 PRINT K$;: RETURN
3000 PRINT CHR$(223); CHR$(8);:
       RETURN
```

Firms Mentioned in this Column

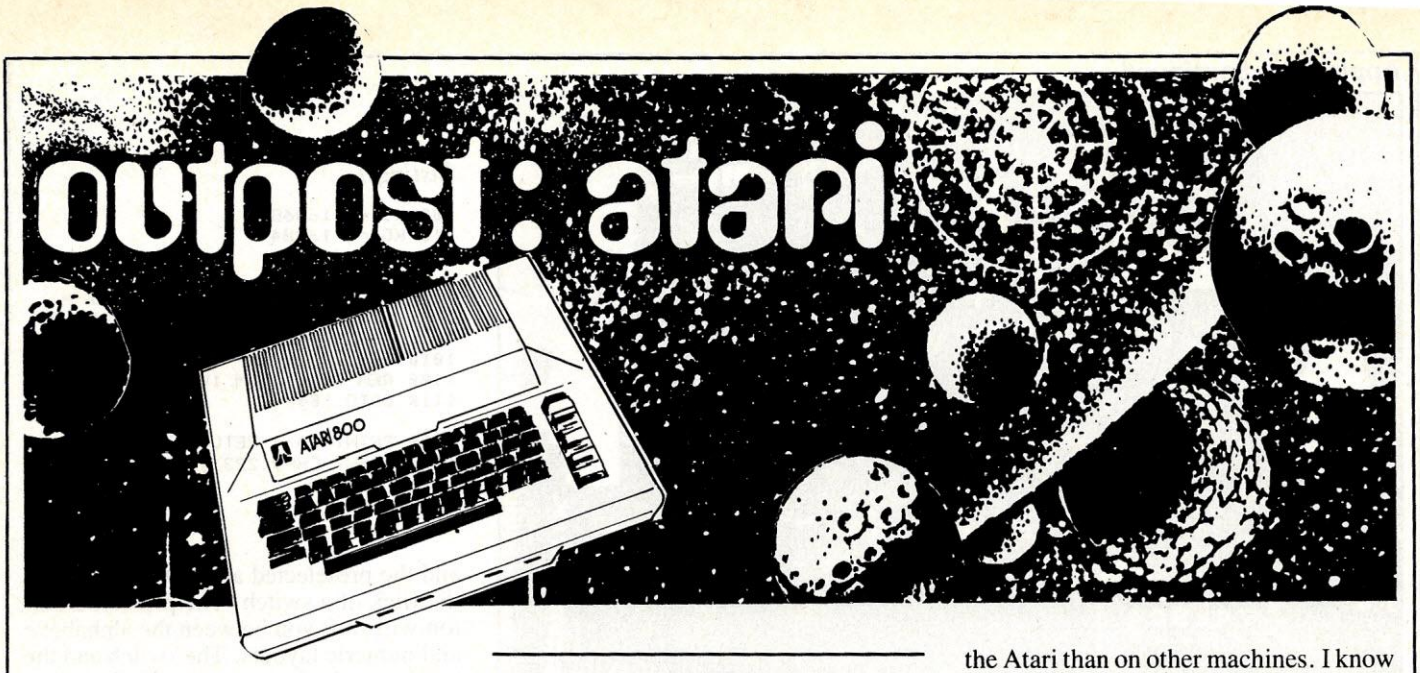
High Order Micro Electronics
17 River St.
Chagrin Falls, OH 44022
(216) 247-3110

The Keyboard Company
7151 Patterson Dr.
Garden Grove, CA 92641
(714) 891-5831

Southern California Research Group
P.O. Box 2231
Goleta, CA 93118
(805) 685-1931



"Oh yeah, my calculator can out-calculate your calculator."



John Anderson

The Upstart Atari

June 4, 1981, *The New York Times* ran a relatively enlightened feature on the microcomputer and its future in the home. One of the "experts" cited in the feature stated the following: "there is almost no sense at all in buying a computer other than a PET, Radio Shack, or Apple." A bit further down the page, in a separate but allied article, the quote appeared *again,* this second time without the word "almost." The article referred to these companies as "the big three."

At the time, I was glad to see that the *Times* had discovered microcomputers, but was chagrined by what I saw as expert narrowmindedness. Still, it came as no surprise to me. I had acquired quite a stiff upper lip by that time. You see, I am an Atari owner.

I remember when I first began shopping seriously for a micro, right about the time the first Ataris were shipped. I had a great deal of trouble getting anyone to talk about the machine. Sales staff seemed so resentful in one computer store, I wondered aloud why they even carried the thing. A salesperson exclaimed to me, through a sneer, that he did not expect it would be carried for long.

Even as recently as a year and a half ago, finding an article concerning the Atari in a computer magazine was a triumph. The machines remained a mystery, even to those who owned them. Documentation and software were scant. I was told by more than one learned microguru that I had made an expensive error. They predicted nothing but early death.

This was not to be. Despite the bad press and initial lack of documentation and software, the Atari was gradually discovered to be a superior machine: a "next-generation" micro, with ROM cartridge capability, a replaceable operating system, sophisticated color graphics capability, and four-channel sound.

Despite initial snobbery and snubbery, buyers began to opt for a good machine at a good price. By Christmas 1981, the Atari was being sold faster than it could be manufactured.

How did the competition respond to the introduction of the Atari? With the introduction of Atari lookalikes. Studying these, I realized Atari must have done something right, to have nearly everybody else shouting "me too!" within a year or so.

The Atari has been called a game machine, and games have certainly sold their share of units. Ted Nelson took a look at *Star Raiders* on a video projection system and proclaimed that the Atari Personal Computer was the "most extraordinary (microcomputer) graphics box ever made." Yet in addition, the Atari could do anything the "big three" could do, and then some. Many prospective purchasers found in the Atari a double bonus: a chance to have a "serious" microcomputer, while owning the greatest game machine around.

And, it was friendly. It is easier to do things right on the Atari, and more importantly, harder to do things wrong. The jargon terms machines like this "user-friendly." Never before had a computer been introduced that was so easy to use. Until the Atari came along, you couldn't expect to take a micro out of its box, plug it in, and have it work.

In the operating system of the machine is a powerful, built-in screen editor, which makes the mechanics of programming much less formidable on the Atari than on other machines. I know for a fact that this, combined with the syntax-checking function of Atari Basic, allowed me to learn Basic programming at a much faster pace than would have been possible with any other microcomputer. These features simply allow the user to recover more gracefully from his own errors, thus vastly increasing the utility of the machine as a learning tool.

Then there is the cost. I literally "paid the price" to be the first on the block with an Atari 800. Now, because of the popularity of the machine, prices have dropped dramatically. A bit of careful shopping can result in a basic unit for under $700. For this price, you receive an 800 with 16K of RAM and Atari Basic. The model 400 is down to about $250.

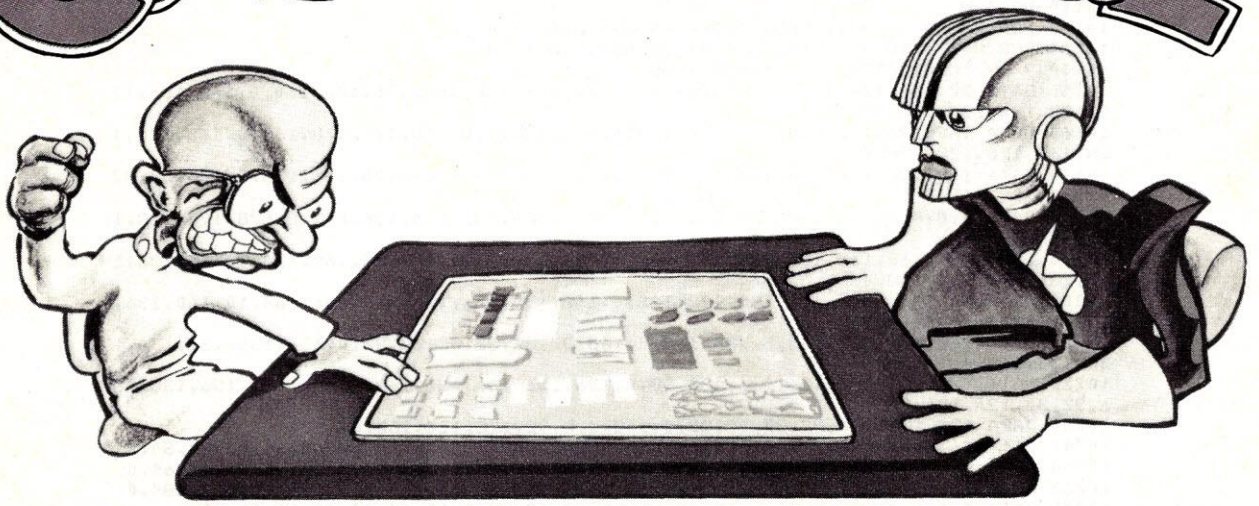
The computers have a built-in RF modulator, and so can be hooked directly to a home TV. A basic unit isn't worth much without cassette or disk storage devices, which constitute an additional expense, however the Atari disk drive has also been heavily discounted, and can be found for under $450. A 48K disk-based system can be put together for under $1400, and that is a good bargain at today's (and tomorrow's) prices.

As for the capabilities of such a system, let me first insert here a warning to those who may be unfamiliar with the moiling and sweaty world of microchauvinism. I feel strongly, as do other Atari owners, that a major part of what a microcomputer must handle superlatively is color graphics and sound. I take this to be a self-evident, foregone and unimpeachable tenet, and will make no effort to argue for or defend myself upon that point. If you do not concur, read on only at your own risk.

The 6502 microprocessor chip is the central processing unit of all current Atari machines, as it is for two of the "big three" machines. However in the

Can you beat the hazards of...

COMPUTER RAGE



Here's the acid test for your computer strategy skills!

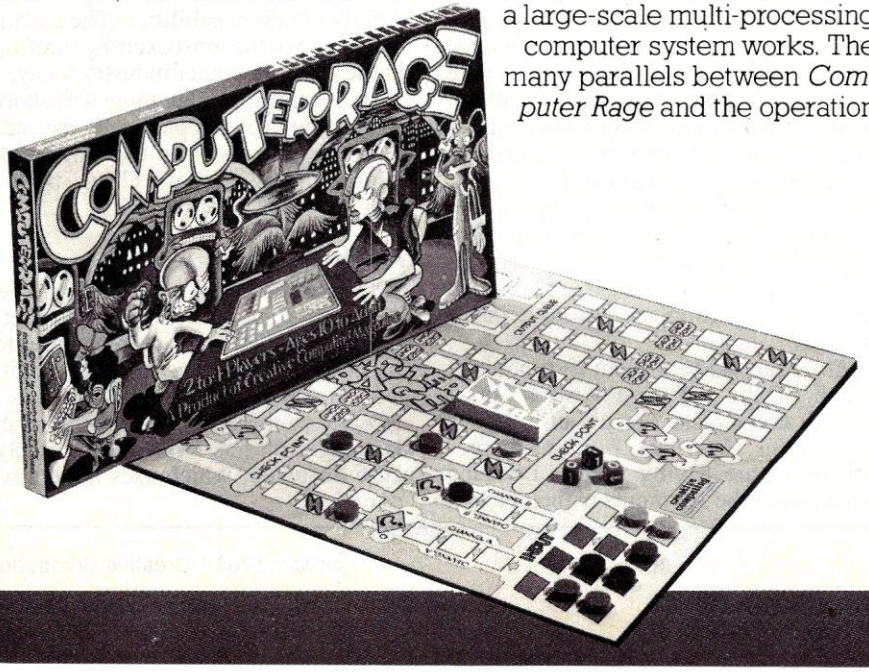
Here's a demanding new board game—the toughest computer game you'll ever play. It's guaranteed to provide you and your friends with hours of competition and playing fun!

The object of *Computer Rage* is to move your three programs from "Input" to "Output" before the other players can. Moves are determined by the roll of dice which give you a 3-bit binary number. Simple enough—until you begin to encounter the hazards: program bugs, scheduling changes, power and program failures, priority interrupts.

The trick is to overcome the hazards and keep your programs moving toward the Output end of the board. "Efficient Programs," "Interrupt Override," "Advantageous Scheduling Changes" and other Interrupt cards help you beat the hazards.

The outcome of any game of *Computer Rage* is a matter of probability, luck and skill. As you play, your ability increases—and so does your understanding of how a large-scale multi-processing computer system works. The many parallels between *Computer Rage* and the operation of a multi-processing computer system are explained in a specially prepared supplement to the rules.

Computer Rage can be played by two to four players, ages ten to adult. Notes for using the game in school have been included. *Computer Rage* comes with a colorful board, 12 program playing pieces, 3 binary dice and 38 Interrupt cards. Only $8.95!



creative computing

Dept. HA9F 39 East Hanover Avenue
Morris Plains, NJ 07950

Send me _____ *Computer Rage* games at $8.95 each, plus $2 postage and handling per order ($3 additional for foreign orders shipped air mail only.) #6Z

☐ **Payment enclosed** $_____ (NJ residents add 5% sales tax.)

☐ **CHARGE MY** ☐ American Express ☐ MasterCard ☐ Visa

Card No._____ Exp. Date_____

Signature_____

Print Name_____

Address_____ Apt._____

City_____

State_____ Zip_____

☐ **Check here for FREE catalog.**

For faster service:
PHONE TOLL FREE: 800-631-8112.
Please have ad in hand when ordering.
(In NJ call 201-540-0445.)

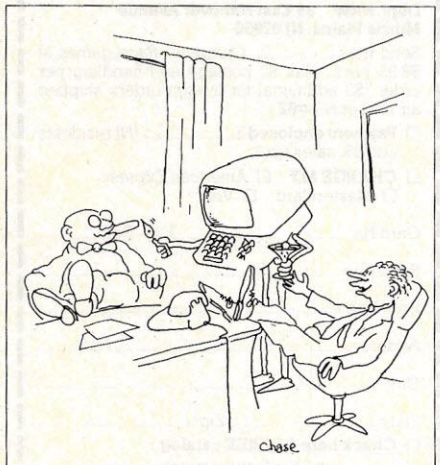
Institutions only:
Purchase orders under $50 not accepted.

```
10000 MT=PEEK(106)
10010 GT=MT-8
10020 POKE 106,GT
10030 GRAPHICS 0
10040 SETCOLOR 2,0,0
10050 CROM=PEEK(756)*256
10060 CRAM=GT*256
10070 POKE 756,GT
10080 ? "character set LOADING"
10090 FOR N=0 TO 1023
10100 POKE CRAM+N,PEEK(CROM+N)
10110 NEXT N
10120 FOR N=264 TO 471:READ A:POKE CRAM+N,A:NEXT N
10130 FOR N=776 TO 983:READ A:POKE CRAM+N,A:NEXT N
10140 ? :? "CHARACTER SET loaded":END
10150 DATA 32,168,136,136,168,136,136,0,160,136,136,160,136,136,160,0,168,136,12
8,128,128,136,168,0
10160 DATA 160,136,136,136,136,136,160,0,168,128,128,168,128,128,168,0,168,128,1
28,168,128,128,128,0
10170 DATA 168,136,128,138,136,136,168,0,136,136,136,168,136,136,136,0,168,32,32
,32,32,32,168,0
10180 DATA 8,8,8,8,136,136,168,0,136,136,136,160,136,136,136,0,128,128,128,128,1
28,128,168,0
10190 DATA 136,168,168,136,136,136,136,0,136,136,168,168,168,168,136,0,168,136,1
36,136,136,136,168,0
10200 DATA 160,136,136,160,128,128,128,0,168,136,136,136,136,136,168,10,160,136,
136,160,136,136,136,0
10210 DATA 168,136,128,168,8,136,168,0,168,32,32,32,32,32,32,0,136,136,136,136,1
36,136,168,0
10220 DATA 136,136,136,136,136,136,32,0,136,136,136,136,168,168,136,0,136,136,13
6,32,32,136,136,0
10230 DATA 136,136,136,32,32,32,32,0,168,8,8,32,128,128,168,0
10240 DATA 16,84,68,68,84,68,68,0,80,68,68,80,68,68,80,0,84,68,64,64,64,68,84,0
10250 DATA 80,68,68,68,68,68,80,0,84,64,64,84,64,64,84,0,84,64,64,84,64,64,64,0
10260 DATA 84,68,64,69,68,68,84,0,68,68,68,84,68,68,68,0,84,16,16,16,16,16,84,0
10270 DATA 4,4,4,4,68,68,84,0,68,68,68,80,68,68,68,0,64,64,64,64,64,64,84,0
10280 DATA 68,84,84,68,68,68,68,0,68,68,84,84,84,84,68,0,84,68,68,68,68,68,84,0
10290 DATA 80,68,68,80,64,64,64,0,84,68,68,68,68,68,84,5,80,68,68,80,68,68,68,0
10300 DATA 84,68,64,84,4,68,84,0,84,16,16,16,16,16,16,0,68,68,68,68,68,68,84,0
10310 DATA 68,68,68,68,68,68,16,0,68,68,68,68,84,84,68,0,68,68,68,16,16,68,68,0
10320 DATA 68,68,68,16,16,16,16,0,84,4,4,16,64,64,84,0
```

Figure 1.

Atari, the 6502 chip is backed up by three others, and therein lies a big difference.

One of these chips, called Antic, is itself a microprocessor. It is capable of an exotic potential known as "direct memory access," or DMA. Antic works in tandem with another chip, the GTIA or CTIA, to handle the video display, thus taking the weight of keeping the video screen "lit up" from the 6502. The CPU can go on to other important jobs.



"This really is a friendly system, J.B.!"

I could attempt to outline each of the capabilities of these chips: 256 colors, up to 16 shades of a single color, 320 x 192 pixel resolution, player-missile graphics, modifiable display lists and character sets. However there really are only two ways to experience their power: watch an Atari graphics demo, or play a quality Atari game. The new GTIA chip, which replaces the CTIA, extends this power yet further.

Still another chip, called Pokey, generates, among other things, four channel sound. This sound can range from pure tone to many levels of distortion, allowing for music as well as sophisticated and complex sound effects generation. Sound is routed through the TV speaker, and so volume control is as simple as the flick of a knob. Sound can be routed just as simply to your stereo. Nearly all music composition and game playing in my home takes place through headphones.

The Atari is not without its problems. Much of the software written for it doesn't come close to truly utilizing its capabilities. It seems as if many programmers are having trouble realizing what power the Atari puts in their hands, and how best to use it. Dual density drives, 80-column capability, and truly professional word processing packages are only just now making an appearance.

But relief is in sight. It was a trickle at first, but third party software began to pour in. The trickle became a gush, and the gush became a torrent. Third party hardware followed soon after. The industry, realizing its initial underestimation of the machine, is compensating.

A variety of talented minds are working with the Atari, investing it with a variety of new capabilities. The machine offers one of the most exciting forefronts in the microcomputer industry today.

Incidentally, the big three will shortly have to move over. I predict by the end of this year Atari will be the number one microcomputer in its class, both in monthly sales and total units.

Multicolor Characters

Figure 1 is a short program with a very neat result: a multicolor character set in graphics 0. The idea goes back quite a ways: I remember first having seen it in *3-D Supergraphics,* from Paul Lutus. A recent example appears in the assembly language tutorial *Page Six,* from Synapse Software, which uses quite a well done font.

Royal Software

WE DEAL EXCLUSIVELY IN PRODUCTS
FOR THE ATARI (THE BEST) COMPUTER

YOUR MARKETPLACE FOR:

* ATARI

BAJA BUGGY

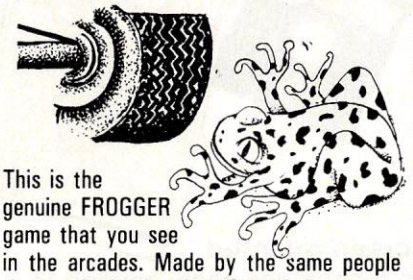
16K Disk OR TAPE

by GAMESTAR

$29.60

If you're looking for a fast action driving game then we recommend this one. Good graphics and sound.

FROGGER



This is the genuine FROGGER game that you see in the arcades. Made by the same people that made Jawbreaker (One of the top ten sellers.)

by ON-LINE

32K Disk 16K Tape $31.40

★ASTRO BATTLES
★LAZER ATTACK
★SPACE WARP
★FLAG SHIP
by ROKLAN MIDWAY

Just like the arcade game that has been so popular. This is one of our BEST sellers for all ages.

$35.10 24K Disk **$39.90** 16K Cart.

HARDWARE

Prices listed are the CASH discount price, charge prices are slightly higher.

800 Computer 16K	$575
800 Computer 48K	$678
400 Computer (used)	$199
810 Disk Drive	$439
850 Interface	$178
410 Recorder	$ 78
16K Ram module	$ 69
32K Ram module	$ 89
Percom Disk Drive	$648
48K Ram module for 400	$178
WICO JOYSTICK	$ 26
Trac Ball controller	$ 63
800/400 Dust cover	$ 9
10 Blank Disks	$ 28
Mark II Modern	$ 99
Alien Group Synthesizer	$153
Epson MX-80FT/Plus	$588
Amdek Color 1 monitor	$387
12' Joystick Extension Cord	$ 10
Computer Paper 1000 8½ x11	$ 17

Trade in your 400 for a NEW 800 Computer. Call for details.

SOFTWARE

ZAXXON

Now you can get that powerful 3-D game for the Atari. Made by one of the BEST game makers, Datasoft. Order early to get yours. D $35.10

WIZARD & THE PRINCESS

A terrific HI-RES graphics adventure that is one of the best for the Atari 40K Disk $29.90

EASTERN FRONT

The MOST popular of all the APX programs and truly one of the best war games for the Atari. D,T $27.90

SAMMY THE SEA SERPENT

A must for the little computerists ages 4-7. The kiddies LOVE this one and "Sammy" too. Tape $15.90

WAR

A colorful war simulation for either one or two players. If you enjoy wargaming, then this great game is certain to please. 32K Disk $22.50

THRESHOLD

Superb graphics makes this one of the BEST space games for the Atari. Fast paced and arcade quality make this a must. 40K Disk $35.10

DE RE ATARI

This manual is a favorite among the serious programmers. Learn the many secrets of the Atari. $17.90

FREE
ATARI PRODUCTS CATALOG
(includes program descriptions)
with any order or
send $1.00 refundable with order
Send your name to get our
FREE monthly flyers

METEOR STORM

The city is about to be destroyed and ONLY you can save its people from destruction. FAST, arcade type action game.

24K Disk
16K Tape **$29.95**

O'RILEY'S MINE

16K Disk or Tape $31.50

by DATASOFT

A SUPER graphic game in which you are the miner and must watch out for mine flooding and monsters of the deep.

CROSSFIRE

The aliens have landed and it's your job to save the city. (If you can!) TOP RATE GAME, ARCADE QUALITY, HI-RES Graphics & Sound.

16K TAPE
32K DISK
$26.90

VISA master charge

TO ORDER CALL (503) 683-5361

HOW TO ORDER: Send check or money order or phone your order using your charge card. Ask about our 48 hour delivery service. Shipping on programs is $2.00 per order in USA or $3.90 for the 48 hour AIR service. Call for Hardware shipping costs. Prices subject to price change without notice.

Store Hours
8 am – 6 pm
Mon. – Sat.

Royal Software
2160 West 11th Ave., Eugene, Oregon 97402

CIRCLE 249 ON READER SERVICE CARD

INFORMA X

Beyond DBMS

Eventually microcomputers will all use **programmer-less** information management systems like INFORMA X®. The next generation in software.

Your microcomputer, no matter how expensive or well designed, is no better than the program it uses. And most programs are limited to only one or two functions. They are for accounting, or payroll, or inventory, or mailing, or filing, or computing, or whatever . . . and usually for just one user, as well.

Soon after buying a first computer every businessman or professional finds he needs to do more than one procedure with it. He also discovers that more than one person in his office will need to use it at the same time.

INFORMA X is the first information management system professionally engineered from its inception to operate in the multi-user, multi-tasking, and multi-processing environment. It is **the only database software you will ever need.**

The unique achievement of INFORMA X is an information system which structures data for storage and retrieval. It is the most efficient framework for an elegant computer filing system. Usually these systems require a programmer to fit them to the particular tasks of your business. INFORMA X provides a programmer-less system for even the **first time user** to create programs which fit exactly his own business needs.

Menu driven, screen oriented tutorial response techniques allow anyone to create, modify or customize programs to their own exact requirements. No "computereze" or cryptic languages are used; only single keystroke command structure has been used through the system's five components: THE DATABASE, THE REPORTER, THE APPLICATION WRITER, THE SECURITY SYSTEM and THE MENU MAKER. Automate your information storage, retrieval and transmittal . . . your way . . . and step into the next generation of business life.

ABACUS DATA is committed to creating software to enhance your business today and tomorrow. We welcome questions and comments. Use our toll free service numbers. **1-800-874-8555** and in Florida call collect **904-398-8547.**

abacus data, inc.™
1920 San Marco Boulevard
Jacksonville, Florida 32207

CURRENT SPECIFICATIONS: Z80, 8085, 8080A Minimum Memory 52K. CP/M® Operating System. Current delivery customized for **TeleVideo®, Molecular®, Action®** and **Osborne® Computer Systems.** (Call for others)

CIRCLE 307 ON READER SERVICE CARD

The technique involved in creating multicolor characters is called artifacting. This is the same phenomenon that sometimes causes ugly glitches in graphics 8 displays. By skipping adjacent pixels, red or blue characters can be formed, and artifacting can be used constructively.

The approach has its limitations. Because the default character size on the Atari is 8 x 8, skipping adjacent pixels results in a character three pixels wide. It is hard to create a font three pixels wide and at the same time keep N's and M's from looking alike, or support lower case.

In order to compensate, I made the font one scan line taller than the default value, and stuck to upper case. Still, I think you will agree the results are remarkable considering the constraints of the approach, and well worth taking the time to type.

Lines 10000 through 10020 define the point in memory at which we will start our redesigned character set. Lines 10030 and 10040 clear the screen, coloring it black, so that the artifacted character set will be clear. I suggest the altered set always be used on a black background.

Lines 10050 and 10060 set up the variables we will use to load the original character set into RAM, and later for overwriting the redefined characters. Line 10070 sets the character set pointer to the beginning of the RAM set. Line 10080 is placed there so you can watch the transformation take place; you can pull this line if you so desire.

Lines 10090 through 10110 load the entire original ROM character set into RAM. Then line 10120 replaces the upper case A through Z with values occurring up ahead as data statements. Likewise line 10130 replaces lower case a through z with newly defined character values.

The new upper case and lower case fonts are the same, with the exception of a one clock horizontal shift. This means that the upper case A through Z will be one color, and the lower a through z another. Because of differences in the way artifacting is handled by the GTIA as opposed to the CTIA, a GTIA machine will have, as a result of running this program, a blue upper case and red lower case, while a CTIA machine will have a red upper case and blue lower case. Not to mention what happens when printing inverse characters. Try it! All other characters, as well as numbers, will remain as default.

You might now incorporate this as a subroutine in other Basic programs (remember to stick a RETURN in there somewhere, and keep the program from hitting line 10000 other than through that initial GOSUB).

```
10 ? "FLASHING TEXT":REM PRECEDING TEXT IN INVERSE
20 POKE 755,1
30 FOR N=1 TO 100:NEXT N
40 POKE 755,2
50 FOR N=1 TO 100:NEXT N
60 GOTO 20
```

Figure 2.

Sheldon Leemon, on whose program, *Instedit*, I designed the font, reminded me that the display list could be modified to display the fonts in any color. I may take up this challenge in a subsequent Outpost. For now, I will leave it to you. List the program in the modified set; you will see that it can even function as a programming tool.

Poking Around

As a result of my comments about memory locations in the November column, I got a slightly indignant letter from Becky Johnson, at Educational Software (formally Santa Cruz Educational Software). She reminded me that their publication *Master Memory Map* had sold more than 10,000 copies at $6.95. Well I admit I hadn't seen the publication at the time, and though it is still not a truly *definitive* list, it has got to be the closest yet. If you wish more information, you can contact them at 4564 Cherryvale Ave., Soquel, CA 95073. (408) 476-4901.

In the meantime, here are some more interesting locations to keep you busy:

Disabling the break key. POKE 16,64 and POKE 53774,64 to disable the break key. Very handy to keep users from interrupting or getting into a program.

Disabling DMA. PEEK (559), then POKE 559,0. This will shut down Antic, allowing the 6502 to speed execution dramatically. POKE 559 with value initially PEEKed to re-enable screen display. Also handy as a "curtain," in concealing the screen during display initialization or other potentially distracting moment. This is as opposed, for example, to resetting graphics mode and setting color registers to black.

Putting a text window into graphics 0. POKE 703,4. This will force all normal text into a text window as in graphics modes. Printing to the upper part of the screen must be accomplished with PRINT #6 statements. Could be handy in writing text adventures (maybe even with the multicolor font). To return to default, POKE 703,24.

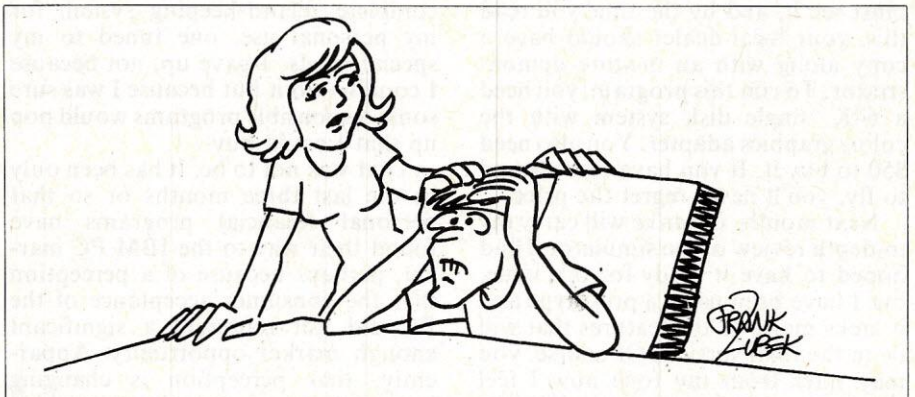
Flashing characters. Set up a loop wherein the value of location 755 varies from the normal, 2, to 1. Figure 2 is an approach to flashing characters.

It is a nice attention getter in programs. We will also look at more sophisticated means of obtaining flashing characters in an upcoming column.

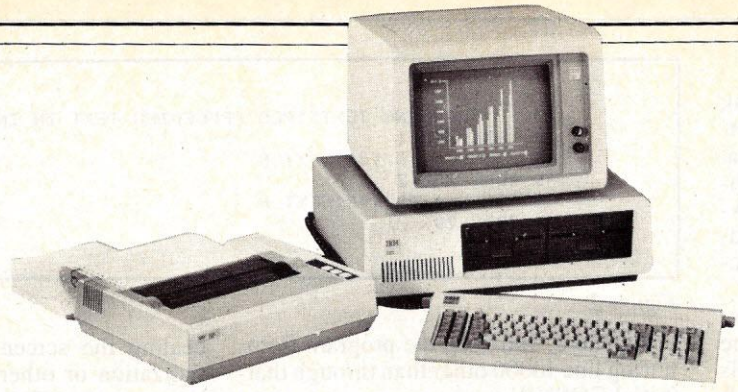
Checking for keypresses. POKE 764,255, then PEEK(764) for internal keycode. Handy to check for any or a specific keypress. Can also be used to "press a key" through software: for example, POKE 764,12 will RETURN automatically.

To enable cassette recorder. POKE 54018,52 to turn cassette play on, POKE 54018,60 to turn it off. Recorder must, of course, be set with cassette in place and play key pressed. Use to sync recorded sound with programs.

Next month we'll look at some new hardware for the Atari from third-party sources, new game software, and present a title card generator program. Until then, keep your computing creative! □



"Harry, the repairman said it would be two more days on your Atari. You can't just sit here!"



nages...ibm images...ibm im

Will Fastie

It's very hard to believe that I have been here for a year, but it's very true. I expect to be here for the next year too, provided I am not forced to go on strike for better working conditions or more money. I am sure such an action can be averted; my attorneys are working around the clock with *Creative's* management team to thrash out an agreement. I hear *PC* is looking for writers. . .

Last month, I ran out of space. This month, I am finishing up with personal finance packages and a few other odds and ends of general interest. First, however, I have to tell you about something very, very exciting.

I consider myself very lucky, and very privileged, to have been given a demonstration copy of a new piece of software for the IBM Personal Computer. The program is from Microsoft. It is Bruce Artwick's *Flight Simulator.*

Mr. Artwick is the brain trust behind the SubLogic flight simulator, a program which is available for Apple II and TRS-80 computers. The IBM version is not merely a cut above those, it is an order of magnitude beyond them. It is fantastic. It is a sight to see, and a trip to fly. You absolutely must see it, and by the time you read this, your local dealer should have a copy along with an in-store demonstrator. To run this program, you need a 64K, single disk system with the color/graphics adapter. You also need $50 to buy it. If you have ever wanted to fly, you'll never regret the price.

Next month, *Creative* will carry my in-depth review of the simulator. I had hoped to have it ready for this issue, but I have been using a prototype and it lacks many of the features that will be in the final version. Of course, you may infer from my tone how I feel about the program, so you might not need the review, eh?

Oh, by the way, for those of you who do not know what I'm talking about, the flight simulator is a program that puts you in the cockpit of a light plane, with a full instrument panel and an out-of-the-window display of the world. You are the pilot, and you fly the plane. Believe me, you really do.

Personal Finance Programs

January is the month many of us begin to think about taxes and our budgets for the forthcoming year, especially if the IRS has mailed out tax return booklets with their usual promptness. I can always be found under a mountain of paper, sorting stubs, calculating interest, and wondering how I could have let my records get into such a state of disarray.

Last year was particularly bad because I procrastinated while I fooled around with the notion of writing a complete record-keeping system for my personal use, one tuned to my special needs. I gave up, not because I couldn't do it but because I was sure some responsible programs would pop up that I could buy.

That was not to be. It has been only in the last three months or so that personal financial programs have found their way to the IBM PC market, perhaps because of a perception that the consumer acceptance of the PC did not represent a significant enough market opportunity. Apparently, that perception is changing because five companies have provided home finance programs for review, and there are several others in the works.

With the five programs in front of me, I had only to decide how best to evaluate them. Just what criteria are important, and on what basis should a consumer make a choice between these products? For me, there are just two criteria, and everything else is a minor detail.

The first consideration is functionality. Now I don't mean features: a program does not have to include every possible bell and whistle to be considered functionally complete. Functionality means that the software performs as specified, and that that specification meets a fundamental requirement, as determined by you, the buyer.

Is the package going to solve *your* problem, and will it do so to the extent that it performs useful work for you? And if the program passes that test, do the other features provided, the ones that are beyond your basic requirements, enhance the product, or are they just eye-catching, without real value and thus unlikely to be used?

These five packages cost from $100 to $200. More important, you will spend a great deal of time with the one you choose if you use it as intended. You owe it to yourself to examine the alternatives carefully, and make a reasoned choice. Make sure the function makes the investment worthwhile.

The second point is human engineering. You will hear a lot about that from me, and I consider it one of the major issues in computing today. You have a right to expect a program with which you must become intimate to be well engineered.

You should not tolerate a program that does unexpected things, fails, does not explain itself, provides more

Lyco Computer Marketing & Consultants

TO ORDER CALL US

TOLL FREE 800-233-8760

In PA 1-717-398-4079

December ATARI SPECIALS

810 Disk Drive ... $ 429.00
32K RAM ..... $ 79.00
400 32K RAM ... $349.00

800 48K... $609.00

ATARI®

A Warner Communications Company

PERCOM : In Stock

Single Drive	CALL
Dual Drive	CALL

(Read all Atari Disks)

PRINTERS : In Stock

Epson Mx 80	$449.00
Epson Mx 80 FT III	$499.00
Okidata 82A	$479.00
Okidata 83A	$719.00
Okidata 84	$1089.00
Citoh	CALL
Prowriter I	$499.00
Prowriter II	CALL
SMITH CORONA TP-1	$625.00
NEC	CALL

(Interfacing Available)

JOYSTICKS : In Stock

Atari CX-40	$18.00
LeStick	$34.00
Wico Command Control	$24.00
WICO RED BALL	$27.95
STICK STAND	$ 6.75

Computer Covers

800	$6.99
400	$6.99
810	$6.99

DISKETTES : In Stock

Maxell MD1 . . .(10)	$34.00
Maxell MD2 . . .(10)	$44.00
Elephant . . .(10)	$21.00

THIRD PARTY SOFTWARE ATARI PROGRAM EXCHANGE

Eastern Front 1941	$25.50
Avalanche	$15.50
Outlaw/Howitzer	$15.50
Dog Daze	$15.50
Wizard of War	$31.00
Gorf	$31.00
Frogger	$26.00

BUSINESS SOFTWARE : In Stock

Atari Word Processing	$109.00
Letter Perfect	$129.00
Test Wizzard	$ 89.00
Datasam/65	$125.00
Interlisp	$125.00
Monkey Wrench	$ 42.00
Utility Disk	$ 36.50
Ultimate Renumber	$ 15.50

ATARI HARDWARE

410 Cassette Recorder	$75.00
825 Printer	$585.00
830 Phone Modem	$149.00
850 Interface	$164.00

PACKAGES

CX481 Entertainer	$69.00
CX482 Educator	$125.00
CX483 Programmer	$49.00
CX494 Communicator	$325.00

SOFTWARE

CXL4012	MISSILE COMMAND	$28.75
CXL4013	ASTEROID	$28.75
CXL4020	CENTIPEDE	$32.75
CXL4022	PACMAN	$32.75
CXL4011	STAR RAIDER	$34.75
CXL4004	BASKETBALL	$26.75
CXL4006	SUPER BREAKOUT	$28.75
CXL4008	SPACE INVADER	$28.75
CX8130	CAVERNS OF MARS	$31.75
CX4108	HANGMAN	$12.75
CX4102	KINGDOM	$12.75
CX4112	STATES & CAPITALS	$12.75
CX4114	EUROPEAN COUNTRIES	$12.75
CX4109	GRAPHIT	$16.75
CX4121	ENERGY CZAR	$12.75
CX4123	SCRAM	$19.75
CX4101	PROGRAMMING I	$19.75
CX4106	PROGRAMMING II	$22.75
CX4117	PROGRAMMING III	$22.75
CXL4015	TELELINK	$21.75
CX4119	FRENCH	$39.75
CX4118	GERMAN	$39.75
CX4120	SPANISH	$39.75
CX4120	SPANISH	$39.75
CXL4007	MUSIC COMPOSER	$33.75
CXL4002	ATARI BASIC	$45.75
CX8126	MICROSOFT BASIC	$65.75
CXL4003	ASSEMBLER EDITOR	$45.75
CX8126	MACROASSEMBLER	$69.75
CXL4018	PILOT HOME	$65.75
CX405	PILOT EDUCATOR	$99.75
CX415	HOME FILING MANAGER	$41.75
CX414	BOOKEEPER	$119.75

NEW RELEASES

CHOP LIFTER	$27.75
APPLE PANIC	$23.75
PREPPIE	$19.95

THIRD PARTY SOFTWARE for atari 800 or 400

K-BYTE

KRAZY SHOOTOUT	$35.00
K-DOS	$65.00
K-STAR PATROL	$37.75
K-RAZY ANTICS	$37.75
K-RAZY KRITTERS	$37.75
Q-BALL JOYSTICK KIT	$6.75

AUTOMATIED SIMULATIONS

Star Warrior	$28.00
Crush, Crumble & Chomp	$23.00

WE CARRY MANY OTHER THIRD PARTY PRODUCTS YOU CAN CALL FOR PRICES ON AND ASK FOR YOUR FREE ATARI PRODUCT CATALOG.

commodore

VIC-20 ..... $189.00

VIC1530 DATASSETTE	$67.00
VIC1540 DISK DRIVE	$499.00
VIC1515 PRINTER	$355.00
VIC1210 3K RAM	$35.00
VIC1110 8K RAM	$52.00
VIC1211A SUPER EXPANDER	$53.00

VIC-20 SOFTWARE

VIC1212 PROGRAMMER AID	$45.00
VIC1213 VICMON	$45.00
VIC1906 SUPER ALIEN	$23.00
VIC1914 ADVENTURE LAND ADVENTURE	$35.00
VIC1915 PRIVATE COVE ADVENTURE	$35.00
VIC1916 MISSION IMPOSSIBLE	$35.00
VIC1917 THE COUNT ADVENTURE	$35.00
VIC1919 SARGON II CHESS	$35.00

THIRD PARTY SOFTWARE

ALIEN BLITZ	$21.00
Omega Race	$35.00
Gorf	$32.00
16K RAM/ROM	$99.00
AMOK	$21.00
SUPER HANGMAN	$16.00
SPIDERS OF MARS	$45.00

MasterCard POLICY VISA

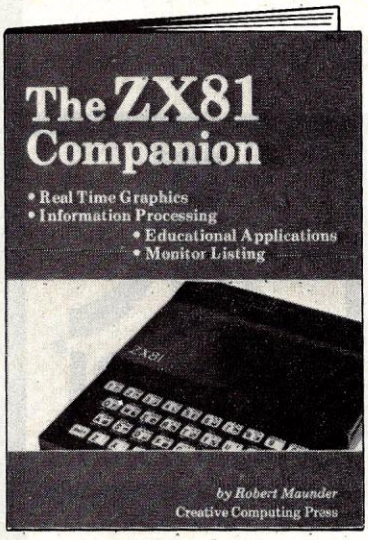
In-Stock items shipped within 24 hours of order. Personal checks require four weeks clearance before shipping. PA residents add sales tax. All products subject to availability and price change. Add 4 % for Mastercard and Visa.

TO ORDER
CALL TOLL FREE
800-233-8760
In PA 1-717-398-4079
or send order to
Lyco Computer
P.O. Box 5088
Jersey Shore, PA 17740

CIRCLE 200 ON READER SERVICE CARD

Get the most from your SINCLAIR

with these practical, program-filled books from *Sync*!



The ZX81 Companion
by Bob Maunder

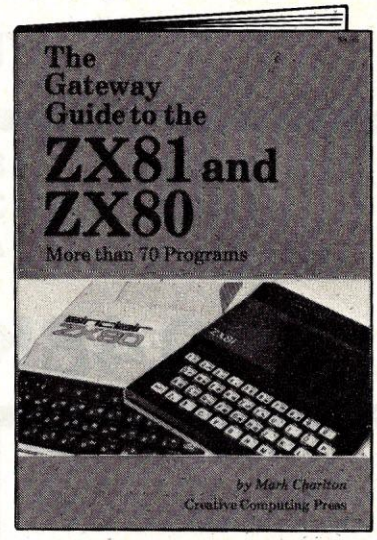
The ZX81 Companion follows the same format as the very popular *ZX80 Companion*, and assists the ZX81 user in four applications areas: graphics, information retrieval, education and games. This practical guide contains scores of fully documented short routines plus complete programs and a disassembled listing of the ZX81 ROM Monitor. "Thoughtfully written, detailed, and illustrated with meaningful programs."—MUSE

5½"x8", 132 pages. #17P $9.95 ($2.00)

Getting Acquainted With Your ZX81
by Tim Hartnell

This informative volume for the new ZX81 user contains more than 70 programs to help the reader get the most from his Sinclair computer. Game programs include Checkers, Alien Imploders, Blastermind, Moon Lander, Breakout, Star Burst and Derby Day. The book also shows programs for cascading sine waves, plotting graphs and tables, data sorting, equation solving, plus the use of PLOT, SCROLL, PRINT, TAB, PEEK, POKE and much more!

5½"x8", 120 pages. #15Y $9.95 ($2.00)



The Gateway Guide to the ZX81 and ZX80
by Mark Charlton

The Gateway Guide is a practical programming manual for the beginner that furnishes over 70 fully documented programs. The majority of the programs have been written for easy conversion from machine to machine (ZX81, 4K ZX80 or 1K ZX80). *The Gateway Guide* describes each function and statement, illustrates it with a demonstration routine or program, and combines it with previously discussed material to help you understand your computer.

5½"x8", 172 pages. #160 $9.95 ($2.00)

Computers for Kids (Sinclair Edition) by Sally Larsen

This new edition of *Computers for Kids* is written specifically to introduce children aged 8 to 13 to the ZX81. The book requires no previous knowledge of algebra, variables or computers, and it enables a youngster to program a ZX81 in less than an hour. There's also a section for parents and teachers. "*Computers for Kids* is the best material available for introducing students to their new computer."

—Donald T. Piele, Professor of Mathematics, University of Wisconsin-Parkside.

8½"x11", 56 pages. #12S $4.95 ($1.00)

All volumes are softbound.

Creative Computing Press Dept. HA5F, 39 East Hanover Ave., Morris Plains, NJ 07950

Please send books listed below:

Item No.	Qty.	Price Each	(P&H)	Total Price

Postage and handling charges appear in parentheses ( ) next to price of book.

Outside U.S.A. add $3.00 per order—shipped airmail only.

☐ ENCLOSED IS $_____. NJ residents add 5% sales tax.
☐ CHARGE MY: ☐ American Express ☐ Visa ☐ MasterCard

Card No._____ Exp. Date_____

Signature_____

Print Name_____

Address_____

City/State/Zip_____

☐ Check here for FREE Creative Computing Catalog.

For faster service, PHONE TOLL FREE: 800-631-8112
(In NJ only: 201-540-0445)
Please refer to Dept. HA5F, when ordering.

than one way to accomplish the same thing, or always expects you to know exactly what to do next.

You *should* expect the program to deal with *any* error encountered, provide you with information if you need it, provide you with assistance if you need it, and let you back out of any situation gracefully, all the while telling you what it is doing.

You should always be able to tell at a glance if the program is waiting for you or working. You should always have the feeling that the situtation is under control and that the program is protecting your interests (and data).

Can you easily tell that a program is well engineered? Yes, usually you can, just by spending a little time at the computer trying it out. And I don't mean running a demo version either, I mean trying the real thing. You will feel it and see it. You will know that you and the program can work together and that the program will not be at odds with you. Sound like dealing with another person? Well, not quite, but it *is* an interaction. Expect a program to be *well behaved*, just like the kind of person with whom you enjoy dealing.

Why am I spending so much time harping on this subject? (See, I really do know what you are thinking.) Because it is important for programs in general, because it is especially important for a program with which extended interaction is required, and because I am generally disappointed with the human engineering of these five finance programs.

The five programs I tested are listed in the various tables accompanying this column. I think the tables provide most of the information from which you can develop your own opinion. Because all the programs provide an acceptable degree of functionality, an examination of the human factors provides considerably more insight. That's what I want to concentrate on.

Of the five programs, one is a clear leader, three fall in the middle, and one is a clear loser. I'll not keep you in suspense: *Money Maestro* is by far the easiest to use, the most forgiving, and the most carefully engineered. *Home Finance Program* is the loser. *Financier, PC/HFP,* and *Home Accountant Plus* are acceptable.

As a first clue as to why *Money Maestro* is on the top of my heap, consider that it is the only one of the five that can be invoked by typing its name, even though the use of a .BAT file under IBM DOS makes such an invocation easy to provide for any program.

Let's look at these programs in reverse order.

Home Finance Program

What I have to say about this program is very limited, because I spent the least amount of time with it. The reason was simple. This program failed in two ways in less than 20 minutes of use, and I consider that so unacceptable that I stopped wasting my time.

The first problem popped up when I tried to enter a comma in the middle of a text string. The text being entered was the description of a check, and the entry was "J. W. Rouse & Co., Inc."Now that seems quite reasonable to me, but the program responded with "Too many data items, ?redo from start," the Basic message emitted when too many entries have been made to an INPUT statement. I could not find a warning about using commas in text input in the manual, in either the section pertaining to the function I was testing or other sections.

The second problem was a crash: in other words, the program stopped running. When this happened, the program returned to Basic, and a standard Basic error message was emitted. These messages give the line number of the error, but unfortunately, this program is protected, so the average user cannot look to see just what is wrong. After this crash, I retired the program.

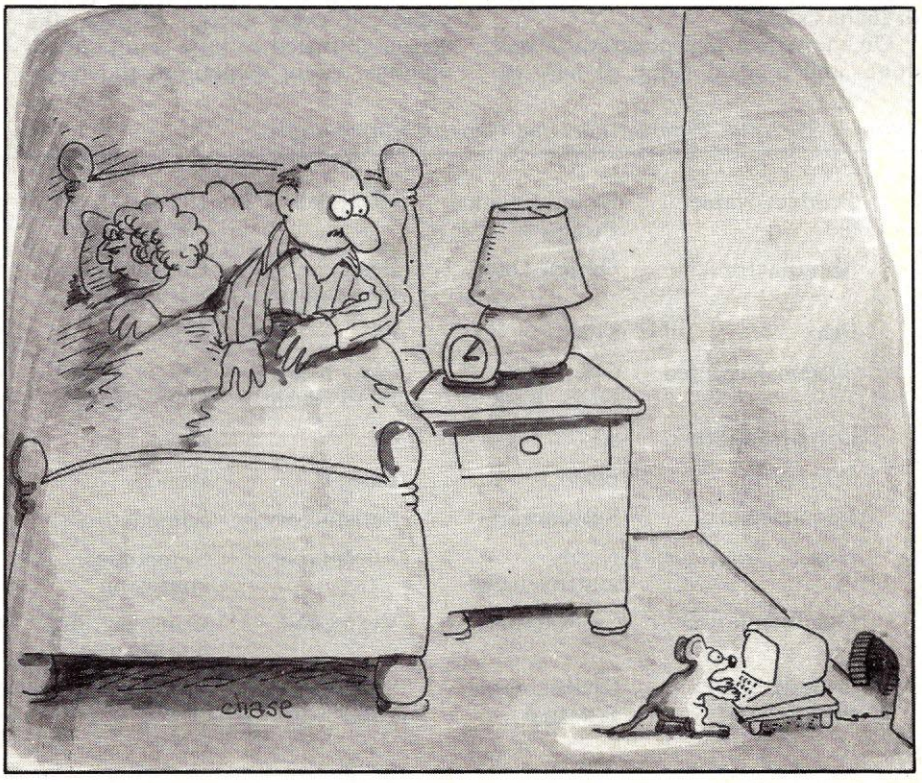
An aside: Basic files can be unprotected. For $10, Data Base Decisions, 14 Bonnie Lane, Atlanta, GA 30328, will tell you how. It's simple. These folks were just quick to figure it out and I figure they deserve ten bucks a shot for the answer.

A couple of specific complaints. The manual was generally good. It contains clear instructions and is well formatted. However, it nowhere explained what the package included, and did not indicate what the second disk, labelled Data Disk was for. The bigger complaint is that the program does not take advantage of two diskette drives if the system has them. Instead, it requires that the user constantly switch between the program and data disk in drive A — something I consider very irritating.

Three In The Middle

Now we come to the three programs which are acceptable. In each case, they provide a set of functions which is reasonable for home financial management, and which operate tolerably well. General information about each package is in Table 1 and the functions performed by each can be found in Table 2.

PC/PFP by Best Programs is the least expensive of the lot at $95. It is well-documented, with a nicely type-



set manual in traditional (by now) IBM style. It is printed with two colors, so explanations and examples are clearly differentiated. The program runs smoothly, and always presents clear, easy to understand prompts.

Functionally, *PC/PFP* is complete. Practically, it is somewhat limited by the number of budget categories provided. It allows 45 categories, 5 of which are for income and the rest of which are for expenses and credit cards. For my personal finances, this is not enough. I had to lump things together in generic categories, making later analysis more difficult.

There is also a limitation of ten tax deduction categories — also a problem for me. Remember that for tax purposes I have a business operation, so I need a little more flexibility. The average consumer might do fine within these limits.

This package suffers mostly from a lack of consistency. This can be found quickly. Some replies to menu prompts require the entry of a number or letter followed by a RETURN (or ENTER, if you prefer), but some take action as soon as the letter is typed.

Because DOS and Basic are buffering keystrokes, a number followed by a RETURN when the RETURN is not required lets the RETURN pass to the next prompt. This can cause the program to go somewhere you weren't expecting. There are other examples of inconsistency.

On the whole, the program is well done, and a good value. It has one strong feature called "split transaction," which allows a single check to cover two or more expenses in different expense categories. This is very convenient for dealing with credit cards.

The Home Accountant Plus from Continental Software is next up the price line at $150. The program supports up to 100 budget categories and 5 checkbooks (a strong feature), can account for assets and liabilities, and can print a net worth statement. Although the program limits the data storage to 1000 transactions per disk, it allows multiple disks to be used.

It is also unique in that it can present graphs on either a text device (like the monochrome display) or a graphics device, and for the latter produces very nice looking graphs in full color.

The program seems to be the most fully featured of the five, and would have earned more of my attention had it not been somewhat difficult to use. At first, this seemed not to be the case. The program, for example, blinks items in a menu if they are the next required thing to do, and refuses to accept any command but that one.

The first time I ran the program it forced me to tell it about my system configuration, and how I planned to use it (e.g., which disk drives would be used for program and data disks). That looked pretty good, but the program fell down later during data entry.

Although clear instructions are provided on every screen display, the action you need to take is not always obvious. Also, sometimes the menu is split, with part of it above the data entry portion of the screen and part of it below. The reason for that escapes me, and I found it confusing.

The document is extensive, an obvious attempt to do well, but I found it difficult to follow. I would have been helped by an index. The information is there, it is just a little tough to find sometimes.

The program can print checks, and comes with a sample and an order form from Nebs Computer Forms, a nice touch.

The Financier from Financier (the first i in both is supposed to be an up-arrow) costs $180. I consider it a little better than *PC/PFP* or *Home Accountant Plus* because it makes a stab at improved human interface. Unfortunately, it does not go all the way.

Again, we have a program with some strong features and good functionality. It also allows split transactions, except it is limited to nine expenses for a single check. A complete set of reports, both summary and detail, is provided.

Each category has a name and a code. In *The Financier* the code is four letters. The program can build reports based on the alphabetical nature of these codes. If all deductions for tax purposes begin with the letter D, they can be recovered by specifying a code range of D to DZZZ. But that reduces the mnemonic value of the codes by eliminating a letter.

Furthermore, it forces extremely careful advance planning to assure that codes which logically relate to

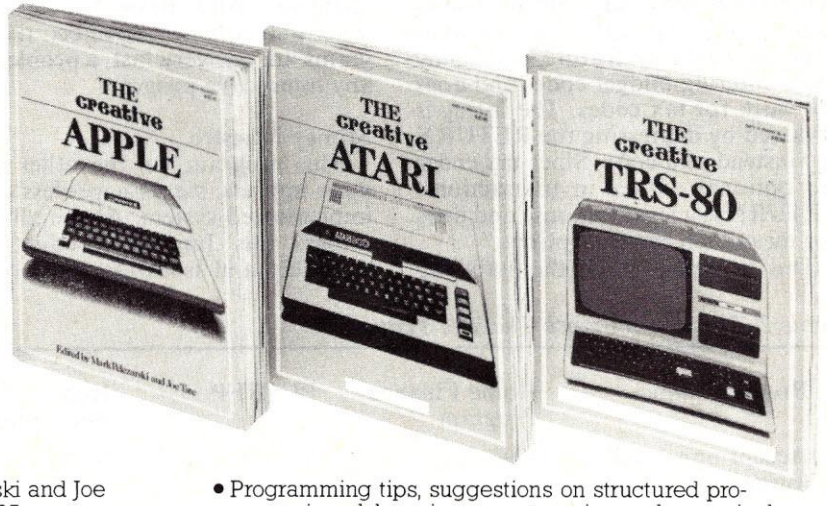
Table 1. Personal Finance Package General Information.

Product Name	Home Finance Program	PC/HFP	Home Accountant+	Financier	Money Maestro
Manufacturer	Design Data	Best Programs	Continental Software	Financier	InnoSys
Price	$100	$95	$150	$180	$200
System Required	64K, 1 disk, DOS, Basic	64K, 1 disk, DOS, Basic	64K, 1 disk, DOS, Basic	64K, 1 disk, DOS, Basic	64K, 1 disk, DOS, Basic
Display Width	80	80	49/80	80	40/80
Written in	Basic	Basic	Basic	Basic	Forth
Functionality	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Human Interface	Needs improvement	Acceptable	Sometimes confusing	Acceptable	Excellent
Documentation	Satisfactory	Very good	Complete, but hard to use	Good	Poor because not written for PC
Overall Impression	Unacceptable as tested	Satisfactory, good value	Satisfactory	Satisfactory, some excellent features	A little expensive, considering features

NEW from *Creative Computing*—

Three great books for Apple, Atari and TRS-80 owners!

Creative Computing has just produced the books you've been waiting for—the most informative, challenging and stimulating volumes yet written for the Apple,® Atari,® or TRS-80® owner!



THE CREATIVE APPLE

brings you 450 pages of the best articles and features on the Apple to appear in the past four years of *Creative Computing*. Revised and updated, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple, with information-packed chapters on:

- Graphics • Music • Education • Word Processing • Business • Applecart
- Software Reviews • Programs—Ready to Run • Tips for Easier Programming
- Branches

Whether you use your Apple for business, teaching, home budgeting or just having fun, you'll find plenty of ways here to get more out of it than you ever dreamed!

THE CREATIVE APPLE, edited by Mark Pelczarski and Joe Tate. 8½" x 11", softcover, illustrated, 450 pp. **$15.95.**

THE CREATIVE ATARI

is an invaluable guide for the average, non-expert user who knows a little about BASIC and simple programming. The Atari is one of the most sophisticated consumer graphics devices ever invented. Yet, because it *is* so powerful, learning how to use its special features can be difficult for all but the most skilled programmers. Here's where THE CREATIVE ATARI can help. Taking articles, columns and tutorials that previously appeared in *Creative Computing,* the authors have updated the material for maximum learning ease. THE CREATIVE ATARI contains four main sections:

- An introduction, with a discussion of Atari memory concepts essential to programming.
- A tutorial on Atari graphics.
- A collection of programming tips, plus information on non-graphics areas.
- Programs you can type in yourself, with reviews of other good commercial programs available for the Atari.

You'll also find an Appendix with a reference guide to useful Atari information. Whether you're a long-time Atari owner or are just thinking about getting one, this is *the* book to have!

THE CREATIVE ATARI, edited by David Small, Sandy Small and George Blank. 8½" x 11", softcover, illustrated, 250 pp. **$15.95.**

THE CREATIVE TRS-80

is a complete guide based on articles that appeared in *Creative Computing,* covering everything from games to business applications for the TRS-80. Chapters include:

- Games, with nine full-length listings you can type directly into your computer.
- Personal productivity, with discussions on expense management, record keeping and other packages.
- Education, detailing uses for pre-school, elementary and high school students.
- Business, and making the most of your investment opportunities.
- Word processing, covering Scripsit, LazyWriter and more.
- Programming tips, suggestions on structured programming, debugging, error trapping and numerical techniques.
- Graphics, with advice from experts on how to enhance your programming capabilities.
- TRS-80 Strings—reprints of this monthly *Creative Computing* column.
- Software, an overview of commercial software ranging from chess to improving your computer's language capabilities.
- Hardware, including discussions on new models, printers and other peripherals.

Your TRS-80 is a wonderful tool for learning, having fun, and improving the quality of your life. With THE CREATIVE TRS-80, you'll expand the uses of your machine—and its value to you—in a hundred new and exciting ways!

THE CREATIVE TRS-80, edited by Ken Mazur. 8½" x 11", softcover, illustrated, 250 pp. **$15.95.**

Registered Trademarks: Apple: Apple Computer Inc.; Atari: Atari Inc.; TRS-80: Radio Shack Division of Tandy Corp.

USE COUPON OR TOLL-FREE NUMBER TO ORDER TODAY!

creative computing Dept HA3F 39 East Hanover Avenue Morris Plains, NJ 07950

CREATIVE APPLE: Send me _____ copies at $15.95 each* plus $2 postage and handling. #18R

CREATIVE ATARI: send me _____ copies at $15.95 each* plus $2 postage and handling. #18B

CREATIVE TRS-80: Send me _____ copies at $15.95 each* plus $2 postage and handling. #18Y

*NJ residents add 5% sales tax. All foreign orders (except Canada and Mexico) add $3 to regular postage and handling charge. Shipped airmail only.

CHECK ONE:

☐ **PAYMENT ENCLOSED** $_____.

☐ **CHARGE MY:** ☐ American Express ☐ MasterCard ☐ Visa

Card No._____ Exp. Date_____

Signature_____

Mr./Mrs./Ms._____
(please print full name)

Address_____ Apt._____

City_____ State_____ Zip_____

INSTITUTIONS ONLY: Purchase orders under $50 not accepted.

For faster service, **PHONE TOLL FREE: 800-631-8112.**
(In NJ call 201-540-0445.)

each other also relate together alphabetically. That is irrational, because no such relationship exists naturally.

The strongest feature of this product is its ability to list the categories whenever it asks you to enter one. That gives you a way to refresh your memory without having to have a list of all the current categories at hand. That is very good. But is is also limited.

The listing shows only the codes, not the description. If a code is particularly cryptic, and some are bound to be, you might still not know what it means. Also, this feature works only when entering budget codes and does not work for tax codes. The listing is obtained by depressing the RETURN key instead of a code. Since tax codes are optional entries in transactions, RETURN is a legal response and does not mean "tell me the options."

This is pretty much the stab *The Financier* took. It is helpful in its current form, but it could be so much better.

The four programs mentioned so far have one thing in common. They are written in Basic. They impress me as programs written by financial experts, even people who have a notion of how they would like to see a program work. However, they do not impress me as programs written by professional programmers or computer scientists. And Basic provides one other unfortunate side-effect: the programs are not very fast, a problem for any interactive program.

Money Maestro

This program, on the other hand, does impress me as a professionally implemented system. Above all other things, this InnoSys product runs smoothly and is extraordinarily well behaved. Of the five programs, it is the only one that can be operated successfully without reading the manual.

The power of the human interface in *Money Maestro* is that is listens carefully to what you type and deals with those inputs in a context. Furthermore, the program can provide help at any time if a question mark is typed, and the user can gracefully withdraw from any point simply by pressing the Esc key.

The help feature is super. For example, when entering a transaction, a budget category must be entered. If you are not certain which one you want, hit ? and *Maestro* tells you that it wants a category. It also tells you that it will list all the ones it knows about if you'd like. So you do, and you find one you like. At that point, you can use Esc to pop back to the original question, or you can just enter

Table 2. Personal Finance Package Features.

Product Name	Home Finance Program	PC/HFP	Home Accountant+	Financier	Money Maestro
Accept upper and lower case?	Yes	Yes	No	Yes	Yes
Number of budget categories	14 pre-defined, 10 subcategories in each	46	100	32,767 or limit of disk	Approx. 200
Transaction storage per 160K diskette	unknown	2400 (200 per month)	1000 multiple disks allowed	1200-1500 multiple disks allowed	Approx. 1250
Credit card management?	No	Yes	Yes	Yes	Yes
Split transactions?	No	Yes	Yes	Yes	No
Forecasting?	Yes	No	Yes	No	No
Reports					
Paginated?	(1)	Yes	Yes	Yes	No
Binding margin?		No	No	No	No
Check register?		Yes	Yes	Yes	No
List of codes?		Yes	Yes	Yes	Yes
Income statement?		Yes	Yes	Yes	No
Balance sheet/ net worth?		No	Yes	Yes (2)	Yes (2)
Cash flows?		Bar graphs income and expense summaries	Screen graphs	No	No
Budget performance?		Yes	Yes	Yes	Yes
Tax report?		Yes	Yes	Yes	Yes

(1) Home Finance Program does not provide a report function. Hard copy of displayed data may be obtained with the PC PrtSc functions.

(2) Function available if budget codes are properly set up. Program does not provide function automatically.

Announcing a new COMPUTER reference book for pilots and navigators!

Computers for Sea & Sky is literally a "state-of-the-art" book that brings air and sea navigation firmly into the computer age. This outstanding new reference volume substitutes computer programs for reams of bulky charts and tables, and replaces hours of tedious hand calculation, research and interpolation with microprocessor speed and accuracy.

Computers for Sea & Sky provides the serious aircraft pilot or ocean navigator with computer programs in BASIC* that perform vital computations in seven major areas:

■ **AVIATION,** including programs for general weight and balance, DME speed correction, flight plans, traffic pattern computations, prop tip speed, turn performance, rate of climb, crosswind computation, and more.

■ **NAVIGATION,** covering compass points, Great Circle computations, course correction, distance from a VOR/OMNI, Area navigation by VOR, horizon computations, rhumbline navigation, dead reckoning, and distance by two bearings.

■ **SPEED and DISTANCE,** with programs for computing line-of-sight distance, distance to an object on the horizon, distance by vertical angle, and speed.

■ **METEOROLOGY,** covering relative humidity and dew point, temperature conversion, aviation atmospheric computations, freezing level/flight level computations, barometric correction and unit conversions, and more.

■ **TIME and THE SKY,** with programs for altitude, azimuth and amplitude computations, figuring time into arc, time zones, and sunrise/sunset.

■ **CHARTS,** including meridional parts, chart scaling and latitude/longitude dimensions.

■ **MATHEMATICS,** covering plane oblique triangles, circular curves, 2D/3D coordinate conversion, haversine computation method, Ageton navigation method and more.

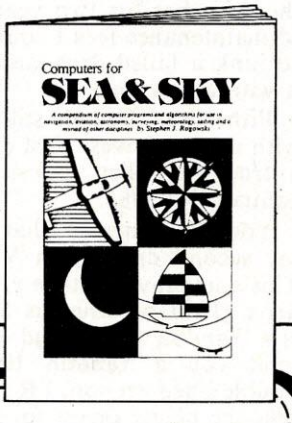
Right now, you perform most of these calculations using a slide rule or calculator, with the aid of tables and charts. The results can be inaccurate, approximate, and time-consuming. By contrast, *Computers for Sea & Sky* can replace *fully 1,000 pages of navigation tables* with programs that produce figures accurate to six decimal places! Many of the programs in *Computers for Sea & Sky* can easily replace on-board equipment costing thousands of dollars. Compare that to the ever-shrinking size and cost of microcomputers, and the money-saving value of SEA & SKY becomes obvious.

Take advantage of the speed and efficiency that a microcomputer can offer you in your plane, on your boat, when doing preflight calculations or mid-ocean computations. Order your copy of SEA & SKY today—only $9.95!

*All programs in *Computers for Sea & Sky* are written in the BASIC developed at the State University of New York Computing Center, and were run and debugged on a UNIVAC 1100/82 system.

About the author:
Stephen J. Rogowski is a noted computer lecturer, author of more than a half-dozen books and 50 articles on computing, as well as a licensed pilot and FAA certified ground instructor.

- Large 8½" by 11" size
- Scores of programs in easy-to-use BASIC
- Contains glossary, index, bibliography and appendix for constants
- Useful for those interested in surveying, astronomy, meteorology and mathematics, too!



creative computing

Dept. HA4F, 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me _____ copies of *Computers for Sea & Sky*, at $9.95, plus $2 postage and handling, each. (Foreign orders—except Mexico and Canada—add $3 additional per order. (Shipped air mail only.) **#14F**

CHECK ONE:
☐ Payment enclosed $_____. NJ residents add 5% sales tax.

Charge my:
☐ American Express
☐ MasterCard
☐ Visa

Card No._____
Expiration Date_____
Signature_____

Mr.
Mrs.
Ms._____
(please print full name)

Address_____ Apt._____

City_____

State/Zip_____

☐ Check here for **FREE** catalog. Please have this in hand when ordering.

Charge orders, CALL TOLL FREE 800-631-8112 (In NJ 201-540-0445)

Institutions only: Purchase orders under $50 not accepted.

the code immediately. The program knows that you mean for the code to be used in the transaction. If you were just listing all the categories, which happens to look the same, the program would ignore an entered code.

But there is more. When asked for a budget category, you don't have to give the code number. You can give the *name* or just the first few letters of the name. If *Maestro* can find something that matches, it automatically assumes that is what you want (although you can use Esc to back it out if you were wrong).

If there is more than one category which matches the entered name, *Maestro* tells you that your name was "ambiguous." A little stuffy, but the program immediately pacifies you with a list of all the matching categories, *showing both code and description*, and asks you to choose one.

Make all the mistakes you want with this program. You can always back up, and you can always yell for help. The prompts are very descriptive, and the displayed instructions are clear.

The program has two operational modes. While you are learning the system, and before you know any better, you will just answer all the questions as they are asked. However, you can use an expert mode which allows answers to be given in advance, thus avoiding prompts. This is very clever, and very easy to learn. But if you forget, you can just revert to answering all the questions. Have it your way.

There are many more examples of this attention to the human interface in *Money Maestro*. I particularly like the way it handles the printing of checks. However, the program is not without its problems. First, it is not as functional as its competitors and it carries a higher price tag, $200.

In particular, it does not handle split transactions and does not allow transaction data to be modified once entered. Second, the manual is poorly done, and has not been revised for the IBM version. It is still in its CP/M form, and it won't make much sense to an IBM owner. Third, neither the program nor the manual provides a mechanism to get the data files on a separate disk. To the naive user, it would seem as if the data *had* to be on the same disk as the program. Finally, the reports are not paginated, do not output form feeds to leave the paper lined up, and do not provide a margin for binding in a three-ring binder, the most likely binder to be found in a household. (None of the other programs provides a margin either.)

InoSys is currently revising the manual, a difficult task because the program is supported on Apple, CP/M, and IBM systems. The company expected to have the new document ready by the time you read this. A revised and extended version of the program is due out sometime early next year.

One final point. The *Maestro* data files are kept in an ASCII format that is very easy for Basic to read. That means you can build your own programs to provide specially formatted reports or other functions you might want that the program as delivered does not. The format of each of the files is described in detail in the manual.

Question: which program wins? Answer: none of them. After having

On Disks and Diskettes

I have become somewhat cramped on my 160K single sided disks, and I am beginning to feel that an investment in double sided disk drives is warranted. My search for a way to convert to the bigger disks at minimal cost has turned up an interesting possibility.

Many companies sell the bigger disk drive. They are available from IBM for $650 and, of course, IBM will maintain and support them if you buy that way. However, the price of the bare disk drive on the open market ranges from $275 to $325. That makes the IBM deal look awful. I have even considered the fact that for two years worth of maintenance fees I could afford to junk a failed drive and replace it with a new one.

Either way, I would still be stuck with my old drives. IBM does have a trade-in policy, but it expires January 31, 1983.

You may remember that I bought my second drive from VR Data. This company will take your 160K drive (IBM or other as long as it is a Tandon 100-1) and $199 and send you a Tandon 100-2, the double sided version. VR Data also sells the bigger drives for $399.

VR Data resells the smaller drives in the TRS-80 market, and there might be some deals lurking here for owners of Model I or III computers.

As for disks, I have now had the opportunity to use several different brands and I thought I would report on my experience to date. I use Radio Shack diskettes (catalog number 26-0305, $39.95 in boxes of ten) extensively, and I have had not a single failure of any kind.

The DOS FORMAT program has never found bad sectors on a Radio Shack disk. Furthermore, my friend Tom uses them in his double sided disk drives, even though Radio Shack only certifies the disks as single sided. He has also had no difficulty. Tom, Rich, and I have used about 120 of these disks without problem.

I have purchased a few Dysan disks (104/1S, 104/1D). I am really sorry to have to say that they have been nothing but trouble. I have had about a 50% fallout rate with them, and a few have been very difficult to format. I say I'm sorry because I have used Dysan disks (and other Dysan media) in the past with extraordinary success, to the extent that I would buy only Dysan 8" disks. I don't know what's going on here.

Verbatim disks are in use on the PC in my office and in a few other small systems, and they have been excellent. I would actually prefer to buy Verbatim over Radio Shack, but I have a harder time finding them in small quantities and then they are more expensive by about $5. Radio Shack is so convenient.

Two other brands are frequently found in software I receive for review. They are Memorex and Elephant. Both seem to hold up pretty well, although my use of them has not been hard. Elephant disks are certainly inexpensive.

Whatever disks you decide to buy, keep track of them carefully so that if they start to fail you can identify the lot. Then find all the disks purchased with that lot and use them for less critical storage requirements. Cyclic backups are a good idea in general, but if you are having any media problems you should religiously duplicate your data. And don't forget to register a complaint with whoever sold those disks to you in the first place. □

tried all the programs, I am not convinced that my accounting work will be eased or reduced. My manual system is rather efficient; for example, I have not had a checkbook reconcilliation error in years.

Furthermore, any program I use has to be usable by my wife, who will not tolerate unnecessary work and will not spend the time to become an expert operator. So for her, *Money Maestro* would be best, but it is not a total solution for our needs.

Ah, well, maybe I *will* write my own after all.

New Products

As time goes on, the size of this section of the column will shrink. The reason is lead time and space, too much of the former and too little of the latter. Most of what I can talk about here will probably already be known to most of you, either through ads or because you have seen the things in stores. What I will carry are items I think have particular interest, or ones that are unique.

IBM has announced SNA 3270 Emulation and RJE support ($700, chalk up one for me) and IBM 3101 emulation ($140), as well as Version 2.0 of the Asynchronous Communications Support package ($60).

An SDLC Communications Adapter ($300) had also been announced, along with a cable ($75). These products, mentioned by IBM as "intentions" at the time the PC was announced, are important additions that allow IBM to continue their penetration in their own large accounts.

In the same vein, Persyst Inc. announced PC/HASP, a multi-user remote job entry HASP workstation

My Favorite Full-Screen Program Editor

A new full-screen program editor has been announced by Satellite Software International (SSI), of Orem, UT. The $195 program, called *P-Edit* (pronounced pea-edit), is my favorite editor, and the one I could not tell you about until now.

SSI has been in business for several years building software products for Data General computers. Although I have tried *P-Edit* on a DG system before, I had not used the program extensively until it became available on the IBM PC. What a mistake. I am now in the process of acquiring it for my DG system at work.

For any software product, and especially for interactive programs, there are two qualities that will distinguish it from the rest of the pack. I have mentioned them in the body of the column: they are good functional match with your requirements, and good human engineering. *P-Edit* has both.

P-Edit has all the features a programmer needs, and most that a programmer wants. Editing is simple, but the program can be taught to perform very complex procedures with SSI's macro facility. The better editors *(PMATE, Vedit)* have similar facilities, but they are not as easy to use as *P-Edit's.*

A procedure is defined for *P-Edit* by manually performing it once. *P-Edit* records the sequence, and can store it temporarily, or permanently if a name is provided. The procedure can then be invoked at any subsequent time. Temporary macros are particularly nice because they are deleted at the end of the editing session. Often there are procedures that are unique to a particular file and only need to be performed once.

The best part of *P-Edit* is the human engineering. Although I think there is room for improvement, *P-Edit* is very easy to use and understand, and very forgiving of errors. It is function key driven, meaning that keys are depressed to invoke functions, as opposed to typing commands or keying code letters.

SSI provides a "template," a paper (I wish it was plastic for durability) form that sits above the keys and identifies which functions are invoked with which keys. *P-Edit* uses primarily Alt-1 through Alt-= (the top row of keys), and also makes use of a few of the left-most function keys.

The most outstanding feature is cursor positioning, which can be performed on the cursor pad very rapidly. Arrow keys move the cursor one character in the direction indicated. They can also be prefaced with a depression of the Home key, which moves the cursor to the top, bottom, left, or right of the screen in the direction indicated. A double depression of Home followed by an arrow moves the cursor to the top or bottom of the file being edited, or the left-most or right-most character in the line. This sounds complicated to explain, but it is so easy and natural to use you can only be amazed.

Other features of *P-Edit* include horizontal scrolling to accommodate line widths of over 80 columns, powerful (but a little different) block movement functions, fast (not the fastest) scrolling through the text, and files of arbitrary length. All this in a program which is 16K long and requires only 48K of memory to operate.

One feature not included in *P-Edit* is split screen editing, or multiple windows. This feature usually allows more than one file to be edited at the same time so that a section of one file can be moved or copied into another. Strangely enough, this would be a relatively simple thing to add to *P-Edit* because memory is not a problem for the program — I guess SSI doesn't see any value in the feature.

Multiple editing is a nice "gee-whiz" feature which, in my experience, is rarely used. *P-Edit* certainly allows other files to be inserted in the text being edited, so the function can be had by doing several independent edits. Split screen editing, giving the ability to look at one section of the file while editing another, is a feature I do wish SSI had included, but the program scrolls through the text rapidly enough to offset the lack of that function.

Finally, *P-Edit* is the tip of the SSI iceberg. SSI's main product for Data General systems is *Word-Perfect*, a terrific word processor. I don't know when it will be ready (I hope soon), but SSI is currently working on the IBM conversion. I have to reserve judgment until I have a chance to review the product, but if they don't make any mistakes they will have the premiere word processor on the small systems market and, of course, it will run in MS-DOS, making it easily available on a vast number of the new generation of micros. □

emulator. The package costs $995 and requires Persyst's DCP/88 Communications Processor card. This device uses an 8088 and up to 64K of on-board RAM, and can support line speeds up to 50 kilobaud. When not being used to run PC/HASP, the board can be used as an outboard processor. Price of the DCP/88 was not available at press time.

By the way, Persyst also manufactures add-in memory and multifunction cards. Their Spectrum series is particularly interesting because it is the only card I know of that provides *two* communication ports. Their 256K board with two ports is $985. A printer port is also available on the same card, and Persyst now offers an electronic disk simulator called Insta-Drive packaged with their boards or separately for $49.95.

Curtis Manufacturing Company, Inc. offers the P.C. Pedestal. This $79.95 item is a very attractive stand that attaches to the bottom of the IBM Monochrome display, allowing it to be tilted or rotated for the optimum viewing angle. Slots, visible in Photo 1, assure adequate cooling to the display. A display extension cable set, which allows the display to be located further away from the system unit, is also available for $49.95. I have one of these units, and it is very nice indeed. It is of very high quality. The cables are very well built. The color of the stand matches the IBM perfectly. Frankly, if you decide to move the system unit away from the keyboard and display, this item is a must because the display is too low if it is not sitting on the system unit.

Nat Hellman III, Incorporated, has announced several accessories for the IBM PC. Their keyboard cover ($12) is made of rigid, smoked plastic and fits neatly over the keyboards of IBM and several other computers and terminals. A clever little disk cover ($8) protects the disk drive area from dust. A manual rack ($24) holds six IBM manuals. Finally, a carrying case ($120) secures the keyboard, system unit, disks and manuals for transport. Photo 2 shows the items.

Photo 1. P.C. Pedestal, from Curtis Manufacturing.

Columbia microSystems, Inc. announced the CMS 1600-IBM disk subsystem for the PC. The product provides two 8″ double sided, double density disks in a thin (2.5″ high) cabinet for a storage capacity of 2.4 megabytes. The unit is compatible with the standard IBM single density format, according to the manufacturer. The price of the system is $1750. With controller and software, the price is $2095. The unit can be seen in Photo 3.

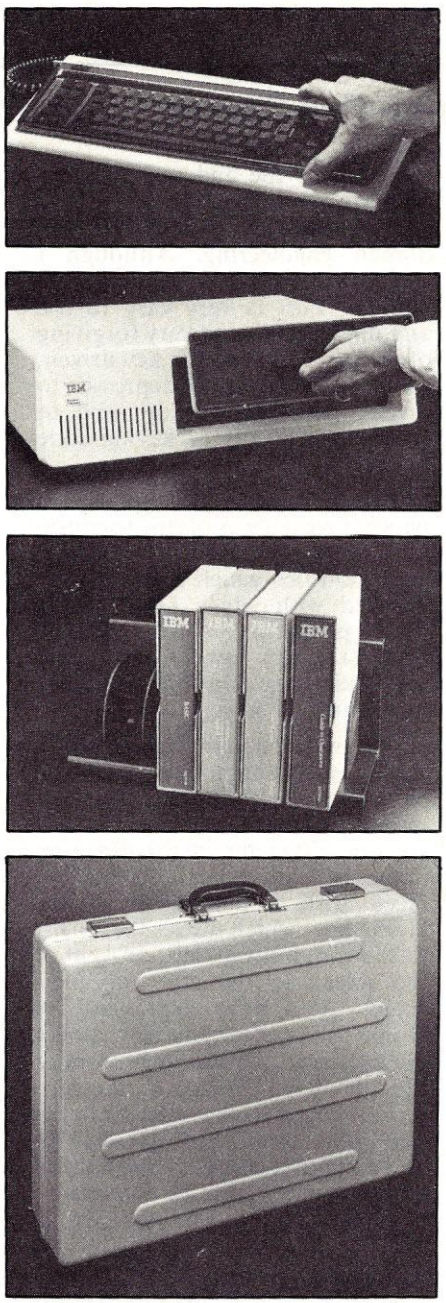


Photo 2. Accessories from Nat Hellman III, Inc.: a) Keyboard Cover; b) Diskette Cover; c) Manual Rack; d) Carrying Case.

Photo 3: Columbia microSystems' CMS-1600-IBM 8″ diskette subsystem

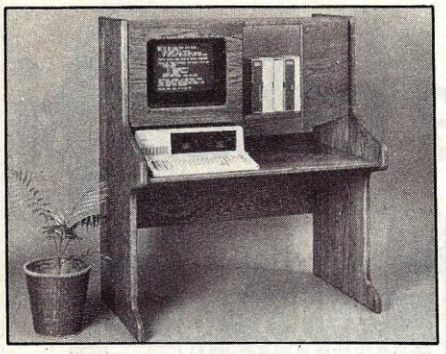
Personal Data Systems, Inc. has announced the PACK-HDR-R disk drive, using the SyQuest 306 *removable* cartridge drive. The hard disk unit has a formatted capacity of 5 Mb with an average access time of 75 milliseconds. The price of $1795 includes a software interface to PC DOS or CP/M-86. Disk Cartridges are expected to be in the $35 price range.

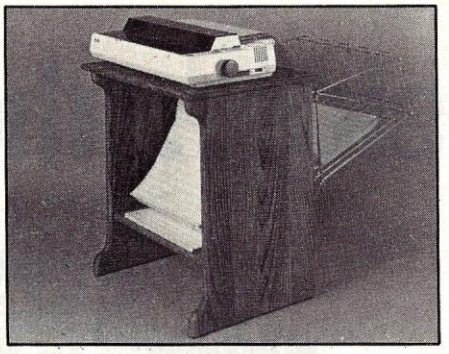
The drive mounts in the system unit where diskette drive B: would normally go. I consider this product significant because it provides a considerable degree of flexibility over a conventional non-removable hard disk, and the price is agressive.

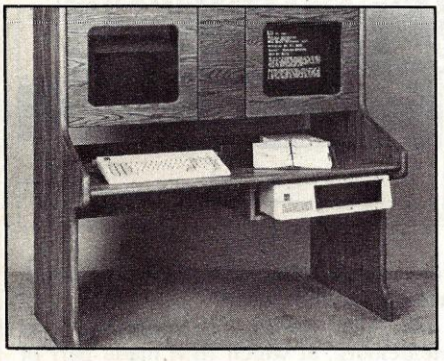
Orchid Technology has announced two new products. The start-up firm offers a graphics card for the IBM Monochrome display for $495. Graphic resolution is 720 horizontal by 320 vertical. The card also includes the Game Adapter, and complete software support for Basic, Pascal, Fortran, and other high-level languages.

The second product is exciting. Called PCnet, the $699 product allows the integration of a local area network. Using baseband technology, the device operates at speeds up to 1 million bits per second over a distance of up to 7000 feet. An addressing scheme which allows 64,000 addresses assures virtually unlimited expansion of the network. Operating software is provided which allows resource sharing of devices such as printers or hard disks.

Forth, Inc. has broken the mold and is now offering a new version of Forth called personalForth. The new product is Forth Inc.'s first mass market product and carries a price of $300. The list of features sounds impressive, including multi-tasking, screen editor,







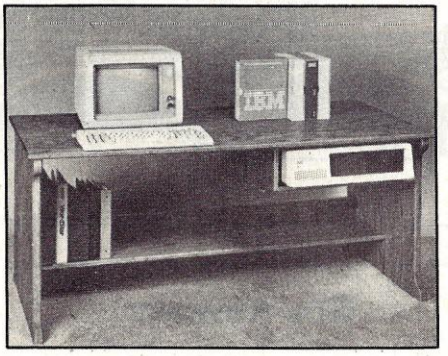


Photo 4: Bench Collection Furniture: a) Model A Desk; b) Model A Printer Stand; c) Model B Desk with optional CPU Shelf; d) Model T Table with optional extra glass door.

IBM DOS file handler, a special "turnkey" compiler, new documentation, and 8087 support (software emulation of the 8087 is *not* provided). The program requires as little as 48K of memory and supports either type of display, two diskette drives, and the printer.

The Bench Collection has announced Electroniture, a series of computer furniture products. Pictured in Photo 4 are four products relating to the IBM PC. All the furniture is made of solid oak and has been designed with the comfort of the user in mind. Price of the Model A Desk is $895. I have seen a color photograph of one of the products and it looks beautiful. My table (remember my table?) is oak too, but I think Sandy would prefer one of these. □

Firms mentioned in this column:

Microsoft Corporation
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080

Design Data Systems Corporation
5270 N. Park Pl. N.E.
Cedar Rapids, IA 52402
(319) 373-1571

Best Programs
P.O. Box 2370
Alexandria, VA 22301
(703) 549-3663

Continental Software
11223 S. Hindry Ave.
Los Angeles, CA 90045
(213) 417-8031

The Dyna-Logic Hyperion Portable Computer

The Hyperion Portable Computer is a new entry in the portable computer sweepstakes that I consider very significant because of Dyna-Logic's claim of total IBM PC functional compatibility. I've mentioned the details in a previous column, but I failed to include the photograph. Here it is.

Photo 5. The Hyperion Portable Computer, from Dynalogic Info-Tech Corporation.

Financier, Inc.
11 Flanders Rd.
Westboro, MA 01581
(617) 366-0950

InnoSys Incorporated
2150 Shattuck Ave.
Berkeley, CA 94704
(415) 843-8122

IBM Corporation
System Products Division,
Entry Systems
P.O. Box 1328
Boca Raton, FL 33432

PerSyst, Inc.
22957 La Cadena
Laguna Hills, CA 92653
(714) 859-8871

Curtis Manufacturing Company, Inc.
One Curtis Rd.
Winchester, NH 03470
(603) 239-6807

Nat Hellman III, Incorporated
5951 East Firestone Blvd.
South Gate, CA 90280
(213) 773-3576

Columbia microSystems, Inc.
110 N. Tenth St.
Columbia, MO 65201
(314) 875-8900 or 443-0255

Forth, Inc.
2309 Pacific Coast Hwy.
Hermosa Beach, CA 90254
(213) 372-8493

The Bench Collection
1387 D Cass Rd.
Santa Rosa, CA 95401
(707) 526-1074

Satellite Software International
288 West Center
Orem, UT 84057
(801) 224-8554
Telex 453168

Data Base Decisions
14 Bonnie Lane
Atlanta, GA 30328

VR Data
777 Henderson Blvd. N-6
Folcroft, PA 19032
(800) 345-8102 or (215) 461-5300

Dynalogic Info-Tech Corp.
141 Bentley Ave.
Ohawa, Canada KZE 6T7
(613) 226-1383

Orchid Technology
1084 Hillview Dr.
Milpitas, CA 95035
(408) 942-8660

Personal Data Systems, Inc.
1110 Wrigley
Milpitas, CA 95035
(408) 262-7880

the other side...the othe si

Guy Kewney

There are, maybe, some 500 IBM PC users in Britain. Not one has bought the kit from IBM.

That in itself is only slightly strange. Where things start getting weird, however, is in the various silly battles that are going on, with people falling over their own toes in an effort to flatter, court, woo, and even intimidate IBM.

What companies say in public (that is, when a journalist asks) and what employees in the company say to each other, don't often match. IBM's way round this is to say nothing to journalists. Other people, however, talk to IBM and then they talk to journalists, and from that, quite often, one can glean some idea of what is going on.

Not this time. From the leading software producers in Britain, you can be told alternately that "IBM will not launch the PC in the UK, ever" or that "IBM will launch tomorrow." I could eat for a week if I got a free lunch for every time I've been told that. So what—it's always like that when IBM prepares a new product.

This time, however, it is a good deal sillier. Like: "We have a wide range of IBM branded software" (a Peachtree employee talking) "which has all been rewritten to UK standards of accounting and business practice, but I'm afraid we couldn't sell it to you, even if you had a PC."

The reason? Apparently IBM will not grant Peachtree UK a dealer license to sell the PC if Peachtree supplies software to IBM PC users who buy direct from the States.

No, I don't believe it either, and my contacts inside IBM (who don't talk to journalists) are equally at a loss to explain this one. After all, if you could guarantee to have some ready-debugged software for your machine, with a couple of months' user maturity, ready when you launched, even Osborne might launch a 16-bit machine.

The people IBM really are getting hot under the collar about are those who take very large advertising spreads in the trade papers, using phrases like "official dealer" who haven't even (say my contacts who don't talk to journalists) phoned IBM to ask if, one day, they may be dealers.

My own feeling is still to wonder at the enthusiasm for such a high-priced bit of hardware with so few special features, with nothing much to run beyond *VisiCalc* and a translation of *Wordstar*—and if you're a fan of the PC, remember that you will have to spend the equivalent of over $5000 to get one here, at least until IBM announces the beast.

Software for the IBM still comes through very slowly. Software for "any Z80 based machine that runs standard CP/M," however, continues to pour through the faucets. The latest is virtual APL.

Virtual APL

It is always a bit hard to start writing about APL to anybody who doesn't use it, because APL users don't just use their language, they worship it, write diaries in it, and define anything from trade exhibition stands to printed circuit boards, as well as merely writing programs in it.

To the serious APL freak, however, the limitation of using the language on micros will always be the smallness of the workspace—the well-known Micro-APL, for instance, offers about 22K in a standard 64K memory map.

At the APL '82 conference in Heidelberg, at which IBM made part of the headlines by releasing APL II, a small British firm called Sigma Software Unit produced a £225 sterling interpreter which offers a megabyte of workspace. Not unnaturally, they caught the other half of the headlines.

VIZ-APL, as Sigma's product is called, is to be marketed in the US by EASI APL Systems Inc., a "recursive" acronym since it includes itself. It achieves the magic by the old trick which IBM invented, of using "virtual memory," but does it on diskettes, which is quite a new trick.

Director Geoffrey Roughton of Sigma says that the interpreter got "the best beta testing you could imagine at Heidelberg, with all the world's top APL enthusiasts doing their best to catch it out."

Apparently the speed of VIZ-APL is comparable with normal Micro-APL unless you do a lot of backward and forward jumps in your program. So don't do it.

More On the BBC Micro

On the British hardware front, the British Broadcasting Corporation's micro has just ended a ten-month famine by moving instantly into glut.

Acorn, the builders, are tearing their hair out, since the machine has been in such short supply (people waiting six to eight months before finding that their credit card application has been cancelled because they had moved in the interim) that just nobody will believe their advertising campaign saying the thing is available.

Acorn is also about to get a severe

shock, if and when the user group takes it to court for trying to charge £10 sterling extra for the operating system upgrade ROM.

The initial manual had more page omissions than pages, and the original Machine Operating System was rather similar in design concept. It wouldn't run disks until July, and only now are users starting to get the necessary firmware to do this.

Not unnaturally, users feel that the original machine, as supplied, fell short of spec, and they don't see why they should have to pay for the privilege of getting what they ordered in the first place.

I think Acorn would agree, except for the fact that version 0.1, now replaced by 1.0, is not the last version to need replacing. Version 1.0 is being burned into EPROM, pending the final ROM design (nobody can say when). And the EPROMs are slower to produce, more costly, and set a nasty precedent, if Acorn supplies them free.

Over The Rainbow

By the time you read this, the ROMs may be ready. Also by the same time, the Rainbow may be seen in the offices of lovers of Digital Equipment CP/M.

The world's second largest computer company (as it has been for about nine months, now) has immensely impressed the market with the cleverness of a system which can run both the new fangled, fancy, non-existent 16-bit software, and also, in case you actually want to do any data processing, the old style, reliable CP/M-80 8-bit stuff.

The world's second largest (etc. etc.) has signally failed to impress, however, with its understanding of this remarkable beast.

At the Personal Computer World Show in London (the biggest micro show in Europe) (see report this issue) the project manager was to be seen frowning over one of the disk drives.

"Let's get this right," said he. "I can see what files are on the second disk, can't I? What do I type?"

You type (all together now): DIR, space, B, colon, return.

"Ah, I see. DIR, space, B, then, what did you say?"

I quite like DEC's plan to sell the Professional as a "truly friendly" machine, but it's one thing to try something out and find it wanting, and it's quite another thing to decide that you know better anyway, and needn't even find out. That company's plans to "restructure this market" sound suspiciously like getting the world into step with DEC.

And they obviously are simply not aware of the difference between a friendly machine without any software, and a rather fragile and unforgiving CP/M beast that comes free with a ton of the stuff.

Espionage

Finally, your visit to Europe this winter, on behalf of the secret intelligence people: You will want, naturally, to blend unobtrusively into the background. Briefing will fit you up with an identity with a nice name like Smith or Schmidt rather than John Doe. Your American accent will pass unnoticed, since most Europeans speak English with that flavor.

The only problem, is: What cover? What occupation should you assume?

I have the answer. You should not, in 1983, pose as a refuse collector over for a symposium, nor as an automobile tycoon looking for an Irish factory to launch a stainless steel wondercar. No, the thing to be is an American software catalogue operator thinking of setting up a warehouse near London Airport.

I didn't know there were so many software catalogue outfits in America until they all came over here to research the market. If you already run one, and were thinking of starting up in Europe, forget it, obviously. But at least, you've missed the crush. □

A unique experience for those who love a challenge . . .

SPITFIRE SIMULATOR...

Fly a 360 mph Spitfire fighter • Pursue and attack 3-D target aircraft • Eight target types (Me 109, Fw 190, etc.) • Scores for targets hit and successful mission completion • Aerobatic (loops, rolls, stalls, etc.) • AIRSIM-I pilots: SPITFIRE SIMULATOR can use AIRSIM-I scenery!

master charge
VISA

$40.00

Mass. residents add 5% sales tax. Overseas shipping add $3.00. For Apple II or II+ with 48 K RAM. Applesoft ROM or equivalent. One disk. Game paddles or joystick.

See your dealer or contact us directly.

Apple is a Trademark of Apple Computer, Inc.
AIRSIM is a Trademark of Mind Systems Corporation.

Mind Systems Corporation
P.O. Box 506
Northampton, MA 01061
(413)586-6463

Personal Electronic Transactions

Marc-Thomas Clifton

I am sure you have heard of the Commodore-64. This month we will take a closer look at Commodore's newest machine.

The 64 comes in the same case as the Vic with the case color changed to a neutral grayish-brown. The keyboard is quieter and has contoured keys and a lighter touch. This is the best Commodore keyboard that I have used. Also, the power supply is outside of the 64, greatly reducing the temptation to use it as a portable toaster. (These improvements are also on the recent Vic's.)

64 Hardware

The 64 has two joystick ports, which can also use paddles, and one of which can also handle a lightpen. Like the Vic, the 64 has the RS-232 port combined with the parallel port. But, the memory expansion slot is *totally* different from that of the Vic, so *none* of the Vic cartridges will work on the 64. An RF modulator is built into the 64, allowing easy TV hookup.

Inside are two new chips to handle the superb graphics and sound capabilities of the 64 and 65535 bytes of memory. When you turn it on, the 64 uses an 8K Basic ROM operating system, giving the user 38911 bytes free for Basic programming. It really does come with 64K of RAM, but the RAM must be selected by POKEing into a control register.

The screen has 25 lines and 40 columns with a border. You can select from 16 colors for the border, screen, and characters. (Eight character colors can be selected directly from the keyboard.) The 64 turns on in a color combination that is similar to the Atari and which is almost illegible on many monitors.

Marc-Thomas Clifton, P.O. Box 262, Palo Alto, CA, 94302.

64 Software

There is already one known bug in the Basic operating system of the 64. Basic cannot handle an SPC or TAB function as the first parameter of PRINT#. For example, PRINT#1, SPC(10) will give a SYNTAX ERROR. To fix this bug, put two quote marks before the SPC or TAB. Example: PRINT#1, ""TAB (15). Commodore failed to include any commands to handle graphics, sound or disk operation—just another rehash of Basic 3.0. (I would welcome a cartridge which provides these extensions.)

Border And Screen Color

See Figure 1 for a listing of interesting registers to POKE. First, let's make the screen more readable. Lookup the color chart in Figure 6, and find the numbers corresponding to green and gray#3. POKE the border register to green and the screen register to gray#3. (POKE 53280,5:POKE 53281,15). The program in Listing 1 goes through all the border and screen colors. When you run it, notice which color combinations create legible text.

Elemental Sprites

A sprite is a graphics character that you can make into any shape or color you want. The sprite is made up of 21 rows of pixels (dots) by 24 columns (see Figure 4). The 64 can have up to eight sprites on the screen at once, each with independent position, color, size, and shape.

First, let's draw a picture of a sprite, and then figure out how to put it into a form that the 64 understands. Notice in Figure 2 that the columns are divided into three sections, each containing eight squares. Each of these squares represents a bit and each section of eight bits is called a byte.

So, to draw the first row of Figure 4 into the 64 requires three bytes. The second row takes up another three bytes, and so on, until row 21. So all told, a sprite takes up to 21*3 bytes, or 63 bytes. Now, even though in our picture the sprite has 21 rows, when we put it into memory, all the bytes are in sequential order. Figure 2 shows how the first two rows are translated into memory.

What values go into memory? Let's look at an individual byte. A byte has a numeric range from 0-255, which in binary, is either all the bits off (0), or all the bits on (255). Table 1 shows the decimal value for each of the bits, counting from right to left.

The decimal value is calculated by raising 2 to the power of the bit number. (This is why we start with Bit 0, 2↑0=1). If you have more than just one bit set in a byte, the value of the byte is determined by adding the decimal values of Table 1 that correspond to each bit

turned on. Each bit that is on in the byte corresponds to the pixel appearing on the screen after you have drawn the sprite.

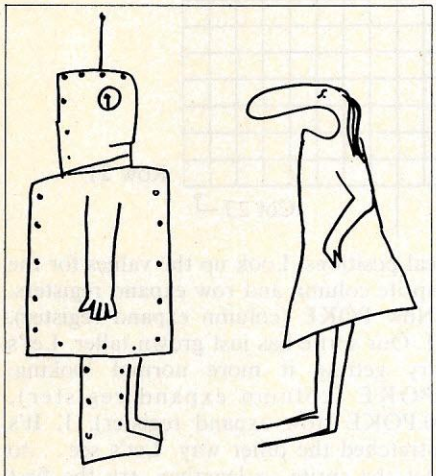
For example, if you wanted the first row to be a solid black line, you would assign the first three bytes the value of 255, which in binary has all the bits on. If you wanted every other pixel on, you would give the byte a value of 170 which in binary is 10101010. (What value would 01010101 be?)

The program in Listing 2 puts a sprite on the screen. Look at the DATA statements, and compare the values of each byte with the pattern of the pixels in Figure 4. After adding up the value of each section in Figure 4, you should get the number in the data statement that corresponds to the row and column of the byte.

After calculating the decimal values of the 63 bytes that make up the sprite, we must decide where to put the bit pattern in the memory of the 64. The sprite pointer register (see Figure 5) tells the 64 where you put the data for the shape. The data address can be found by taking the sprite pointer value and multiplying it by 64. So if we give the sprite pointer a value of 13, the memory location into which we put the sprite will be 13*64, or 832.

Now let's choose a sprite to work with. By POKEing the sprite0 pointer register to 13, the 64 will look for the shape of sprite0 starting at address 832, so the next thing to do is put our data into memory. Lines 1000-1065 in Listing 2 POKE the data appropriately. Now, we have drawn a sprite, found out how to convert it into numbers, POKEd it into memory and told the 64 where it is found in RAM.

The last two things that we must do are to tell the 64 that we want sprite0



"You've got one of the most expensive high-speed RAMs, Harry. Don't tell me you can't remember where you were last night!"

Table 1.

Decimal	Binary
Bit 0: 1	00000001
Bit 1: 2	00000010
Bit 2: 4	00000100
Bit 3: 8	00001000
Bit 4: 16	00010000
Bit 5: 32	00100000
Bit 6: 64	01000000
Bit 7: 128	10000000

Listing 1.

```
10 FOR I = 0 TO 16 : FOR J = 0 TO 16
20 POKE 53280,J : POKE 53281,I
25 FOR K = 1 TO 150 : NEXT
30 GOSUB 50
40 NEXT J,I
45 END
50 POKE 53280,3 : POKE 53281,15
55 PRINT"THE BORDER COLOR VALUE YOU JUST SAW WAS";J
60 PRINT"THE BACKGROUND COLOR VALUE YOU JUST SAW WAS";I
65 RETURN
```

Figure 1.

Register Name	Register Value
Sprite0 column position	53248
Sprite0 row position	53249
Sprite1 column position	53250
Sprite1 row position	53251
Sprite2 column position	53252
Sprite2 row position	53253
Sprite3 column position	53254
Sprite3 row position	53255
Sprite4 column position	53256
Sprite4 row position	53257
Sprite5 column position	53258
Sprite5 row position	53259
Sprite6 column position	53260
Sprite6 row position	53261
Sprite7 column position	53262
Sprite7 row position	53263
Sprite control register	53269
Sprite row expand register	53271
Sprite column expand reg.	53277
Sprite-Sprite collision detect	53278
Border color	53280
Background color	53281
Sprite0 color	53287
Sprite1 color	53288
Sprite2 color	53289
Sprite3 color	53290
Sprite4 color	53291
Sprite5 color	53292
Sprite6 color	53293
Sprite7 color	53294
Sprite0 pointer	2040
Sprite1 pointer	2041
Sprite2 pointer	2042
Sprite3 pointer	2043
Sprite4 pointer	2044
Sprite5 pointer	2045
Sprite6 pointer	2046
Sprite7 pointer	2047

displayed on the screen and to give it a row and column position. In Figure 1, the sprite control register is used to determine which sprite is to be on the screen.

There is only one register to handle all eight sprites, so each bit in the register is assigned to a sprite. Figure 3 gives the layout of the sprite control register. To turn sprite0 on, bit 0 of the control register must be set to 1 by POKEing (sprite control register), 1. (See line 70 in Listing 2.)

The sprite0 column position and sprite0 row position registers are used to place the sprite on the screen. The position of the sprite can be from 0-255 in both the column and row position. The number you POKE into the registers corresponds to the number of pixels across and down starting at the upper lefthand corner of the screen.

To put the sprite at the middle of the screen, POKE (sprite0 column position), 160 and POKE (sprite0 row position), 120. (See line 40 in Listing 2). Type the program in and run it. The sprite will appear in the middle of the screen. Now we can concentrate on moving it, and changing its color and size.

Note: whenever I say POKE (sprite0 color register), 3 or any similar statement, the label sprite0 color register must be replaced with the actual value of the sprite0 color register, or whatever register is in the parentheses. Remember, Figure 1 is the list of all the registers used for sprite manipulation.

First, let's explore moving the sprite in a horizontal direction. Currently, the column position is 160. Try changing it to 159 by POKE (sprite0 column register), 159. Did you see the sprite move over a little? To move the sprite smoothly from left to right, we can write a loop that decrements the column position by one, and has a small delay loop so the sprite doesn't zip across the screen. Try this:

```
FOR I = 159 TO 20 : POKE 53248, I :
FOR J = 1 TO 100 : NEXT J,I
```

Watch the sprite move across the screen. By adjusting the maximum value of J (currently 100), you can make the sprite move faster or slower. Now try moving the sprite vertically. (Hint: it is exactly the same loop, with one number changed.) Now, for our color demonstration, please put the sprite back into the middle of the screen.

Each sprite has a color register which you can use to give it any one of the 16 colors. Each sprite can have a color independent of any other sprite. Find the sprite0 color register in Figure 1, and experiment by POKEing into it values from 0 to 15. Notice that the number you POKE into the color register and the color of the sprite correspond to the chart in Figure 5.

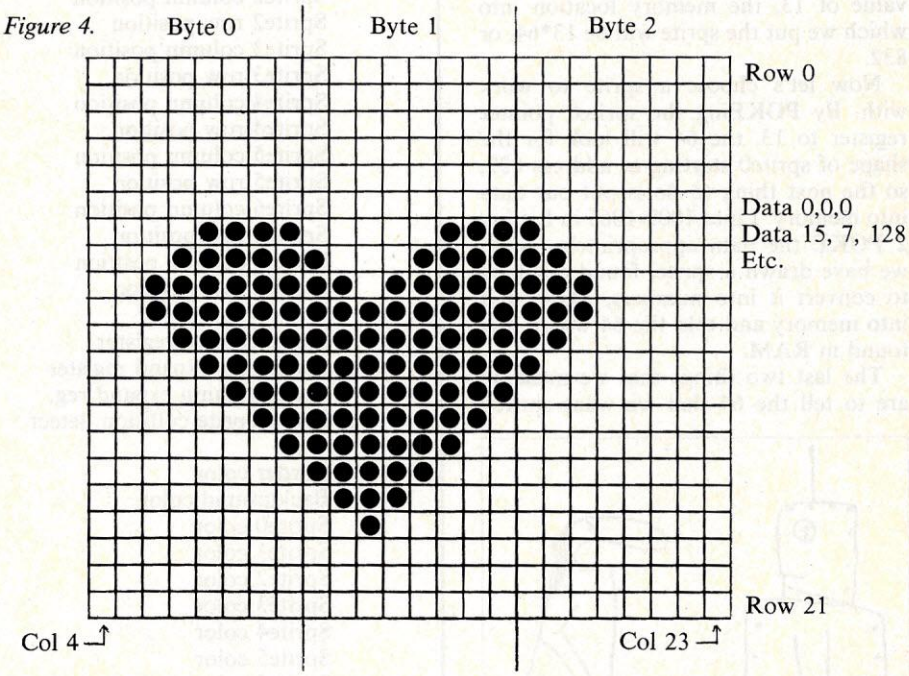
Figure 2.

```
row1,col1  ;  row1,col2  ;  row1,col3
row2,col1  ;  row2,col2  ;  row2,col3

. . . . .row1,col1;row1,col2;row1,col3;row2,col1;row2,col2;row2,col3 . . . . .
```

Figure 3.

Sprite Pointer: register value (10-20)			table address
10	x	64	= 640
11			704
12			768
13			832
14			896
15			960
16			1024
17			1088
18			1152
19			1216
20			1280

Figure 4.



By now, you might also note that the sprite did not scroll off the screen as normal text does, nor did it appear when you cleared the screen. In fact, you can write over the sprite, and the 64 will try to merge the two together. There are two ways to remove a sprite: POKE everything back to zero, or reset the machine.

The 64 can also expand the sprite to double size, in both horizontal and vertical positions. Look up the values for the sprite column and row expand registers. Now POKE (column expand register), 1. Our sprite has just grown taller. Let's try getting it more normal looking: POKE (column expand register), 0:POKE (row expand register), 1. It's stretched the other way. Let's see . . .to get the sprite to lengthen, try the first POKE again. There, now it's twice the size it used to be. (It's up to you to look up the actual numbers this time.)

The expand registers work the same way the sprite control register works, where each bit determines the sprite number, and whether it is expanded (1), or not (0). This way you can control all eight sprite expansions with just two registers.

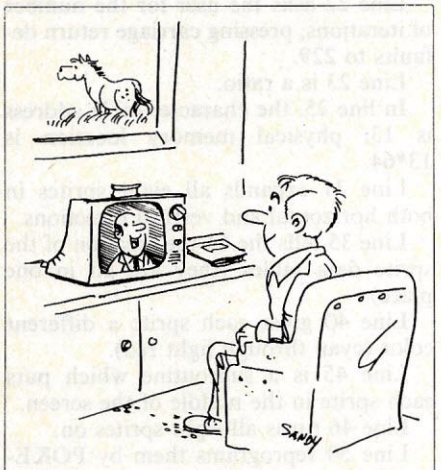
So far, we have used only one sprite out of the eight. Let's put another sprite on the screen giving it the same shape as sprite0. (I'm lazy), but a different color. To put sprite1 on the screen, POKE the sprite control register so both sprites 0 and 1 will be on (first two bits). Then POKE the sprite1 pointer register to the same data location as sprite0. Type in the lines in Listing 3. (Remember to look up the numbers from Figure 1.)

First notice that sprite0 is twice as large as sprite1. Now take the Basic statements we used to make sprite0 move from left to right, but modifying it so that sprite1 moves from left to right. Watch what happens.

Sprite1 passes behind sprite0. Why? Each sprite has a priority, which tells the 64 if it appears in front or behind another sprite. Sprite0 has priority over all other sprites. Sprite1 has priority over sprites 2-7, etc. Sprite priority can be used to make an airplane fly in front of the sun, but have both airplane and sun disappear behind a cloud. The program in Listing 4 demonstrates priority by putting all eight sprites on the screen at one location, and then moving them in a large circle, each with a different rate of speed.

The sprite collision register is used to determine if sprites have collided. Each bit of the collision register represents a sprite, so when our sprite0 and sprite1 collide, the collision register will contain a 3 (00000011).

Important: Whenever a collision happens, you must reset the collision regis-



"Tonight's guest on Boston Pops will be an ALF 9-voice synthesizer."

Listing 2.

```
10 V=53248
20 POKE V+21,0
30 TBL=13:MEM=TBL*64
40 POKE V,160:POKE V+1,120
50 POKE V+23,1:POKE V+29,1
60 POKE V+39,2
65 POKE 2040,TBL
70 POKE V+21,1
75 FOR I=0 TO 62=READJ:POKE 832+I,J:NEXT
1000 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
1005 DATA 15,7,128
1010 DATA 31,143,192
1015 DATA 63,223,224
1020 DATA 63,255,224
1025 DATA 31,255,192
1030 DATA 15,255,128
1035 DATA 7,255,0
1040 DATA 3,254,0
1045 DATA 1,252,0
1050 DATA 0,248,0
1055 DATA 0,112,0
1060 DATA 0,32,0
1065 DATA 0,0,0,0,0,0,0,0,0
```

Listing 3.

```
POKE (sprite0 col reg),100 : POKE (sprite0 row reg),120
POKE (sprite0 color reg),2 : POKE (sprite1 color reg),6
POKE (sprite1 col reg),200 : POKE (sprite1 row reg),120
```

Figure 5.

Color	Color Value E
black	0
white	1
red	2
cyan	3
purple	4
green	5
blue	6
yellow	7
orange	8
brown	9
light red	10
gray #1	11
gray #2	12
light green	13
light blue	14
gray #3	15

Figure 6.

Sprite control register

1 byte:	0	0	0	0	0	0	0	0
sprite:	7	6	5	4	3	2	1	0

ter to 0, otherwise the 64 will think that the sprites are still colliding. The collision register is 0 when there are no collisions. The program in Listing 5 uses collision detection; one sprite (a large box) contains another sprite (a bouncing ball). Whenever the ball hits one of the walls, it sets the collision detection register, and new direction for the ball is chosen.

How The Programs Work

The programs in Listings 4 and 5 were suggested to me by Gregory Yob, and I thought they were excellent demonstrations, so I decided to code them. Space is limited, so these notes are rather terse.

These programs are just a sample of what can be done with sprites. I would enjoy hearing from you if you create any interesting designs, pictures, or animation.

If you write to Gregory Yob, he will pass your letters on to me.

Listing 4

Line 5 reserves variable space for eight pairs of xy coordinates, 0-15.

Line 6 reserves variable space for eight separate rates in which the sprites travel in the circle.

Line 7 defaults the number of iterations to 229.

Line 10 sets up the 64 with a green border and black background.

Line 15 clears the screen and chooses a character color.

Line 20, v is the start of sprite register variable.

Line 21 turns off all sprites.

Listing 4.

```
5 DIMS(15)
6 DIM I(7)
7 CY=229
10 POKE53280,5:POKE53281,0
15 PRINTCHR$(147);CHR$(159)
20 V=53248
21 POKEV+21,0
22 INPUT"# OF ITERATIONS PER CYCLE";CY
23 IT=CY/6.26666666
24 PRINTCHR$(147)
25 TBL=13:MEM=TBL*64
31 POKEV+23,255:POKEV+29,255
35 FORI=2040TO2047:POKEI,TBL:NEXT
40 FORI=39TO46:POKEV+I,I-36
45 GOSUB85
46 POKEV+21,255
50 FORI=0TO62:READJ:POKEMEM+I,J:NEXT
60 K=K+1:IFK=CY+1THENGOSUB85:END
62 FORI=14TOOSTEP-2
63 I(I/2)=I(I/2)+(INT(I/2)+1)/IT
65 S(I)=50*SIN(I(I/2))+160
70 S(I+1)=50*COS(I(I/2))+120
71 POKEV+I,S(I):POKEV+I+1,S(I+1)
75 NEXTI
80 GOTO 60
85 FORI=0TO14STEP2:POKEV+I,160:POKEV+I+1,170:NEXT:RETURN
1000 DATA 0,0,0,0,0,0,0,0,0
1005 DATA 0,255,0,3,129,192,6,0,48,12,0,24,24,0,12,48,0,6,48,0,6,48,0,6
1010 DATA 48,0,6,48,0,6,24,0,12,12,0,24,6,0,48,3,129,192,0,255,0
1015 DATA 0,0,0,0,0,0,0,0,0
```

Listing 5.

```
5 DIMS(3)
8 POKE54296,0:POKE54277,190:POKE54278,248:POKE54273,17
9 POKE54272,37:POKE54276,17
10 POKE53280,5:POKE53281,0
15 PRINTCHR$(147);CHR$(159)
20 V=53248
21 POKEV+21,0
25 TBL=13:MEM=TBL*64
31 POKEV+23,3:POKEV+29,3
35 POKE2040,TBL:POKE2041,TBL+1
40 POKEV+39,4:POKEV+40,13
45 GOSUB85
46 POKEV+21,3
50 FORI=0TO124:READJ:POKEMEM+I,J:NEXT
55 GOSUB95:GOSUB120
60 POKEV,S(0)+X2
61 POKEV+1,S(1)+Y2
65 POKEV+2,S(2)+X1
70 POKEV+3,S(3)+Y1
73 GOSUB150
75 IFPEEK(V+30)=0THENS(2)=S(2)+X1:S(3)=S(3)+Y1:S(0)=S(0)+X2:S(1)
   =S(1)+Y2:GOTO60
76 GOSUB90:POKEV,S(0)-X2:POKEV+1,S(1)-Y2
77 POKEV+2,S(2)-X1:POKEV+3,S(3)-Y1
84 POKEV+30,0:GOTO 55
85 FORI=0TO2STEP2:POKEV+I,160:POKEV+I+1,120:S(I)=160:S(I+1)=120:
   NEXT:RETURN
90 POKE54296,15
91 FORI=1TO75:NEXT:POKE54296,0:RETURN
95 X1=4*RND(0)-2
100 IFABS(X1)<.6THEN95
105 Y1=4*RND(0)-2
110 IFABS(Y1)<.6THEN105
115 RETURN
120 X2=2*RND(0)-1
125 IFABS(X1)<.6THEN120
130 Y2=2*RND(0)-1
135 IFABS(Y1)<.6THEN130
140 RETURN
150 IFS(1)<60THENS(1)=60
155 IFS(1)>200THENS(1)=200
160 IFS(0)>240THENS(0)=240
165 IFS(0)<20THENS(0)=20
170 RETURN
1000 DATA 255,255,255,128,0,1,128,0,1
1005 DATA 128,0,1,128,0,1,128,0,1,128,0,1,128,0,1,128,0,1,128,0,1
1010 DATA 128,0,1,128,0,1,128,0,1,128,0,1,128,0,1,128,0,1,128,0,1,128,0,1
1011 DATA128,0,1,128,0,1,255,255,255
1015 DATA 0,0,0,0,0,0,0,0,0
1020 DATA 0,0,0,0,0,0,0,0,0
1025 DATA 0,0,0,0,0,0,0,0,0
1030 DATA 0,0,0,0,0,0,0,0,0
1035 DATA 0,0,12,0,0,12,0,0,0,0
1040 DATA 0,0,0,0,0,0,0,0,0
1045 DATA 0,0,0,0,0,0,0,0,0
1050 DATA 0,0,0,0,0,0,0,0,0
1055 DATA 0,0,0,0,0,0,0,0,0
1065 DATA 0,0,0,0,0,0,0,0,0
```

Line 22 asks the user for the number of iterations; pressing carriage return defaults to 229.

Line 23 is a ratio.

In line 25, the character table address is 13: physical memory location is 13*64.

Line 31 expands all eight sprites in both horizontal and vertical directions.

Line 35 tells the 64 the location of the sprite data tables (they are all in one place).

Line 40 gives each sprite a different color (cyan through light red).

Line 45 is a subroutine which puts each sprite in the middle of the screen.

Line 46 turns all eight sprites on.

Line 50 reprograms them by POKEing data into them.

Line 60 checks if the cycle is complete and if so, ends the program.

Line 62 is the main loop that moves all eight sprites.

Line 63 changes their polar coordinate position.

Line 65 updates the horizontal coordinate.

Line 70 updates the vertical coordinate.

Line 71 tells the 64 the new positions.

Line 75 continues with the loop.

Line 80 goes back to the beginning of the loop.

Line 85 is the subroutine that centers all the sprites on top of each other.

Lines 1000-1015 contain all the data required for the shape of a circle.

Listing 5

Line 5 reserves variable space for two sprites, each with a horizontal and vertical location.

Line 8 programs the 64 to play a tone.

Line 9 programs the 64 for a tone frequency.

Line 10 sets the 64 up with a green border and black background.

Line 15 clears the screen and changes the character color.

Line 20 is the start of the sprite registers.

Line 21 turns off all sprites.

Line 25 defines the start of the sprite data table in memory.

Line 31 expands the first two sprites.

Line 35 tells the 64 where the sprite data table is for sprite0 and sprite1.

Line 40 programs the sprite to a purple box and light green ball.

Line 45 puts the sprites in the middle of the screen.

Line 46 turns the sprites on.

Line 50 defines the shape of both sprites.

Line 55 chooses a random velocity for both box and ball.

Lines 60-70 move the sprites.

Line 73 checks if the box has reached one of the edges of the screen; this limits the movement of the box to within a predefined area.

Line 75 checks for a collision; if the two sprites haven't collided, the program continues to move them.

Line 76 causes a beep to be emitted, and the box to be put back to its original location if they have collided.

Line 77 puts the ball back to its original location.

Line 84 resets the sprite collision register to an "uncollided" state and goes back to choosing a new velocity for both box and ball.

Line 85 positions the box and ball in the middle of the screen.

Line 90 is a subroutine which emits a beep by turning the volume on.

Line 91 after waiting a little while, turns the volume off and returns to the main flow of the program.

Lines 95-140 are two subroutines used in choosing a velocity for the box and ball; the program checks if the velocity is too slow, and chooses another if it is.

Lines 1000-1011 contain the data for the box.

Lines 1015-1065 contain the data for the ball. □

"Before you get down to basic, take out the garbage."

ATR8000: THE DOUBLE DENSITY DISK INTERFACE FOR THE ATARI® 800/400

The ATR8000 disk interface converts the ATARI 800/400 into a double density business machine . . . at an affordable price. The ATR8000:

- Comes with 16K RAM for disk and printer buffer memory. A 64K upgrade is available.
- Operates with standard 5¼" or 8" drives.
- Has a Z80 4MHz controller.
- Gives dual processor flexibility: Z80 or 6502.
- Comes standard with a serial or parallel port.
- Is software compatible with existing ATARI software.
- With the addition of OSA+ Version 4, the ATR8000 is a double density system that doubles disk storage capacity.
- Is CP/M compatible (with the 64K upgrade).

PRICING: ATR8000	$499.95	5¼" disk drive	$399.95
64K upgrade	-Call-	5¼" drive cable	$ 35.00
OSA+ Ver. 4	$ 49.95	8" drive cable	-Call-
		Parallel or serial printer cable	$29.00

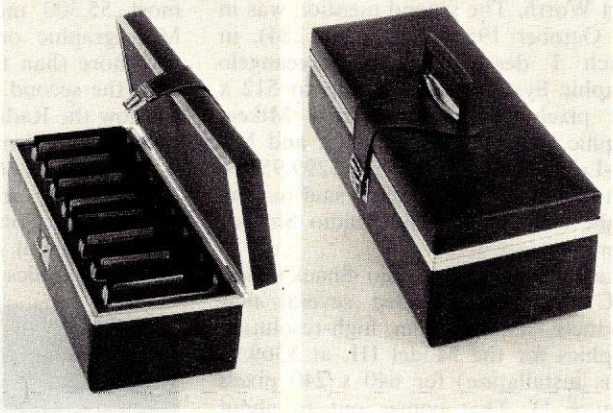
CONTACT:

SOFTWARE PUBLISHERS, INC.
2500 E. Randol Mill Rd.
Suite 125
Arlington, TX 76011
(817) 469-1181

ATARI is a trademark of ATARI, Inc.
CP/M is a trademark of Digital Research, Inc.

CIRCLE 266 ON READER SERVICE CARD

FRIGHTENED BY A PLASTIC CASE



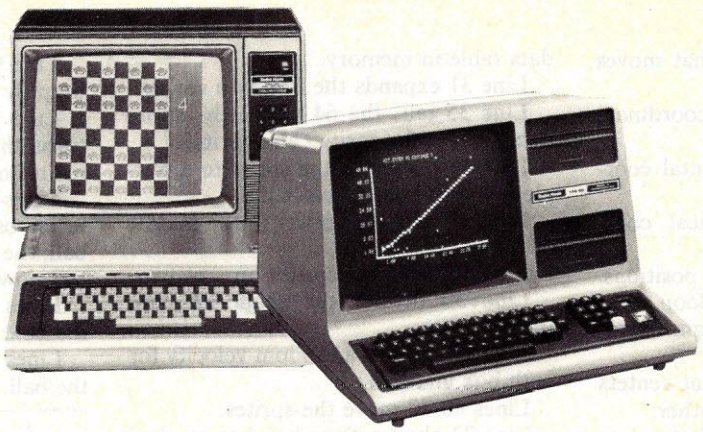
Were you ever frightened to carry your 5¼ floppies out of the security of your home or office, because of that flimsy plastic case you keep your discs in.

Store and carry 100 discs safely and securely.
Each disc pocket is surrounded by an inch of high density foam. Inhibits crushing, jarring, summer's heat, and winter's cold.

100 disc 5¼ floppy carrying case $39.95 ea.
Dealer Inquiries Invited. Phone or mail orders accepted.
Check, Money order, MasterCard, Visa
For Shipping add $2.00, N.Y. State residents Add Sales Tax
Product Design and Copyright © 1982 By Greg Carbonaro

Unique Software Inc.
POST OFFICE BOX N, DEER PARK, NEW YORK 11729 (516) 666-7577

CIRCLE 280 ON READER SERVICE CARD



pings...trs-80 strings...trs-8

Stephen B. Gray

At the 47th rising of the TRS-80 moon, we look out over the frosty landscape and catch sight of some comments on high-resolution graphics and hard disk drives, find out how to restore the silvery shine of our keyboard surrounds, and examine the word/graphics *CopyArt* processor and a short program that determines the day of any given date.

High Resolution

High-resolution graphics for the Model III was first mentioned in the September 1982 column (p. 211), after I'd heard in London that it was forthcoming from Fort Worth. The second mention was in the October 1982 column (p. 284), in which I described the Mikeeangelo Graphic System ($369 for up to 512 x 192 pixels; recently renamed Mikeegraphic and reduced to $340), and Micro-Lab's Grafyx Solution ($299.95 for up to 512 x 192 pixels), and said readers might want to wait for Radio Shack's offering.

Last September, Radio Shack's new RSC-8 catalog included several new products, among them high-resolution graphics for the Model III, at $369.95 (plus installation) for 640 x 240 pixels (Figure 1). That comes out to about 85.33 pixels per inch horizontally, 36.23 per inch vertically, which does indeed sound like it could provide what the catalog calls "amazingly fine detail," for "sophisticated business graphs, tables, charts, maps, illustrations, geometric patterns—and animation!"

The package includes a 32K RAM board, manual and diskette with Graphics Basic and a library of assembly language subroutines. The Graphics Basic includes commands for drawing a circle, arc or ellipse; drawing a line between points; shading an area in one of several available patterns; turning an individual pixel on or off (with PRESET); putting the bit-pattern contents of an array onto the screen (useful for animation); and turning the graphics screen on or off.

The RSC-8 catalog says the Model III hi-res graphics package is "available 12/30/82." Mebbe. Anyway, it offers almost 55,300 more pixels than either Mikeegraphic or Grafyx Solution, for $30 more than the first, and $70 more than the second. However, let's wait to see how the Radio Shack hi-res software compares. Byron Mumford's *Rescom* (Oct. 1982, p. 286) has 14 commands for Mikeegraphic; and the software supplied with Grafyx Solution looks even better, with just about every one of the Radio Shack Graphics Basic commands, plus some others that Fort Worth doesn't seem to have included: complement every point on the hi-res screen for an inverse display; draw a box whose diagonal's ends are at two given points; and copy the contents of the hi-res and text screen to a printer with graphics capabilities. (However, it may be possible to create an inverse display by using the POINT and PRESET commands). We'll see, as soon as I can get the Radio Shack hi-res graphics board installed in my Model III.

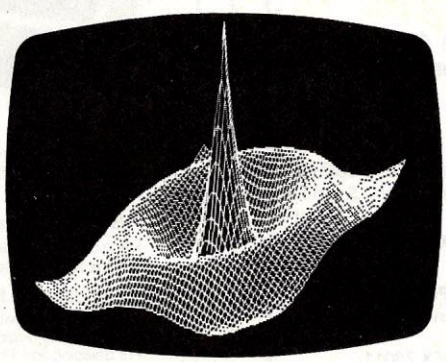


Figure 1. High-resolution graphics, as offered for the Model III TRS-80, provides 153,600 pixels for fine detail.

Note that the high resolution (640 x 240) provides exactly five times as many pixels in both the horizontal and vertical directions as does the standard resolution (128 x 48). Which would mean, if the hi-res graphics area is the same rectangular shape, with the same aspect ratio, 3:7, but only a fifth as large. However, looking very closely at Figure 1, you can see that the pixels are almost square (rounded, in the photo), which makes graphics easier to create. And one of Radio Shack's software people confirms that the hi-res pixel is indeed almost square, with a 4:5 aspect ratio. How come? Well, he says the hi-res graphics area may be bigger than the lo-res graphics area. We'll check that out later, after acquiring a hi-res board.

The 153,000 pixels take 153,000 bits of memory to store. If Radio Shack uses a 32K graphics memory board, that means it provides 32,000 times 8 bits, or 256,000 bits, which means there are 102,400 unused bits on that board. So why not put only 20K, or 160,000 bits of RAM memory, on the graphics board? According to a Radio Shack source, it may simply be more economical "to use the chips we chose," which must mean

January 1983 © Creative Computing

DOSPLUS 4.0, the perfect score.

The DOSPLUS 4.0 hard drive system is here!

A hard drive without the dynamic new DOSPLUS 4.0 is like an eggshell without the egg. The new DOSPLUS 4.0 is the leading edge—the latest in the line of advanced disk operating systems from MICRO-SYSTEMS SOFTWARE, INC. It's the only current operating system written from the ground up for hard disk operation. Not just a driver but a fully developed system. What that means to you is more bang for your buck! Finally an unlimited TRS-80 for small business. For only $1899 you get the DOSPLUS "PLUS."

THE DOSPLUS 4.0 FEATURES

- Single volume addressing/Double sided floppies seen as one drive-one file can expand to limit of the hard drive
- Hard Disk—disk editing utilities
- Incredible I/O speed
- Runs any combination of densities or tracks
- Also operates 8'' drives with special hardware—comes with expanded users guide and complete DOS technical section on I/O calls and DCB organization
- Ability to use hard drive as the "system" drive.

"PLUS" MANY OF THE SENSATIONAL NEW DOSPLUS 3.4 FEATURES

- BASIC array sort—multi key, multi array
- Tape/Disk—Disk/Tape utility (with relocator)
- Input (controlled screen input)
- Random access and ASCII modification on Diskdump
- BASIC checks for active "DO"
- Backup and Format from a "DO" file
- Much improved Backup (More reliable)

$1899 **TAKE YOUR MICRO TO THE MAX. ORDER NOW!**

COMPLETE WITH 5 MEG SYSTEM.

- I/O package much faster (disk access time reduced)
- Repeat last DOS command with ''/'' [ENTER]
- Short directory (filename and extension) available
- Short directory of Model III TRSDOS disks
- Single file convert from Model III TRSDOS
- COMPLETE device routing supported (DOS and BASIC)
- Ability to save BASIC programs directly to another machines' memory (if equipped with DOSPLUS 3.4)

NOTE: The final versions of 3.4 and 4.0 will have almost identical features and documentation.

THE COMPLETE SYSTEM

- Smooth, silent, swift
- Error-free disk I/O
- *Add on up to 4, 10 meg units for a total of 40 megabytes!
- Plugs on the 50 pin data bus.—no loss of floppy drives
- Completely self-contained—just plug it in and go

*10 meg units available Soon.

NOTE: Specify 40 or 80 track when ordering DOS diskette. After initial bootup, user can create any DOS desired.

The first in the industry backed by a lifetime warranty**

**Lifetime warranty on original media

DOSPLUS

DOSPLUS first in quality! First in the industry!

MICRO SYSTEMS SOFTWARE, INC.
4301-18 Oak Circle
Boca Raton, FL 33431
To order call toll free 1-800-327-8724
For product information (305) 983-3390

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

CIRCLE 210 ON READER SERVICE CARD

they need stock only one size of RAM chip, perhaps a 64K chip, for the hi-res board. Somebody will undoubtedly find a way to use the 102,400 idle RAM bits.

The graphics memory, by the way, is independent, and can overlay text in the regular video memory, so graphics and text can be combined in one display.

The assembly language subroutines are there only if and when you want to use the graphics commands from a language other than Basic, such as Fortran or Cobol. If you use only Basic, you'll never need those subroutines.

Hard Disk Drive for Models I and III

Forecasting some Radio Shack products isn't all that difficult After all, the RSC-7 catalog included hi-res graphics

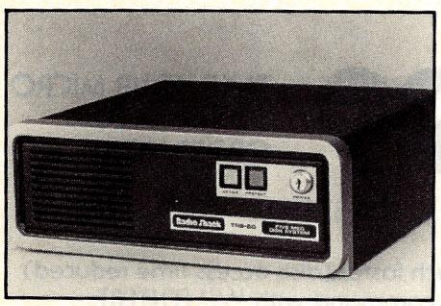


Figure 2. The hard-disk drive for the TRS-80 Model III or I TRS-80 adds 5 megabytes of storage.

for the Model II, with exactly the same resolution and Graphics Basic commands as for what was to come later for the Model III (but at $499).

It was only a matter of time before Radio Shack offered such a highly desirable item as hi-res graphics for the Model III. The RSC-6 catalog offered a hard disk system for Models II and 16 with 8.4 megabytes of storage for $4495. Again, it was only a matter of time before a similar hard disk system was available for the Model III; the RSC-8 catalog has it, for the III (and I, with an adapter), at $2495 for 5 megabytes of storage (Figure 2). I had known quite some time before this writing that Radio Shack had ordered hard disk drives for the Model III (no, I didn't get the information from Fort Worth), but there was no point saying anything before now, because Radio Shack has enough problems without people calling up to ask when the hard disk drives are coming. The RSC-8 catalog gives all the details, plus an availability date of 11/15/82.

Incidentally, those prices for the hard disk drives are for the primary drives, which include a hard disk operating system. The secondary drives are less ($3485 for the II, $1995 for the III); up to four hard disk drives can be attached to a Model I, II, III, or 16 TRS-80, for a total of 20 or over 30 megabytes of storage, depending on the model.

Why use a hard disk (also called a Winchester) system? You can eliminate most, if not all, of the tiresome business of having to put one floppy disk after another into your drives (except when it comes to backup disks). This may not be a big deal if you are a hobbyist, but for a business with many records, hard disks save a lot of time, not only because most floppy disk programs and data can be transferred to hard disk, but because they are then available much, much faster. On the Model II floppy disk drive, for example, the transfer rate is 500 kilobits per second. The Model II hard disk transfer rate is 4.34 megabits per second, providing what the catalog calls "extremely fast access to programs and data."

Aluminum Sprayed on Plastic II

The problem of the aluminum paint wearing off the keyboard of your TRS-80 if you rest your hands on it too much was mentioned in June 1982 (p. 217). The question was asked, "Has anybody found a spray-on or brush-on paint that matches the TRS-80's aluminum color?"

Michael B. Rowe, P.E., of Simplified Software Systems, which sells computers, accessories and software out of Hickory, NC, wrote:

"In one of your recent columns, you addressed the problem of the paint being rubbed off the TRS-80. Being in the software business, we use our machines constantly, and as a result we had the same problem. Our solution was arrived at by buying several different brands of aerosol-type aluminum sprays, and using molded-plastic outlet boxes for tests. What we decided on proved to be a satisfactory color match, and probably a better finish than the original. The procedure requires that you follow these steps carefully.

1. If the computer is out of warranty, remove the aluminum shell from the keyboard—or, in the case of the Model III, the whole top—as a unit. *Caution*: Be extremely careful when removing the top from the III to be sure you do not damage the neck of the CRT.

2. Use extra-fine (220 to 600 grit) sandpaper to slightly roughen the surface to be coated. Carefully remove all sanding dust!

3. Apply Krylon, Dull Aluminum 1403, to the area to be coated, in several light coats rather than one heavy coat. It dries quite rapidly, so only 20 to 30 seconds is required between these light coats.

4. After the dull aluminum spray has dried for several minutes—preferably not more than four or five—apply several light coats of K-Mart brand Fast-Drying Spray Enamel in CLEAR U3733. This may result in slightly more surface sheen than the original, but generally blends nicely. On our Model IIIs we did not have to paint the whole top to get a satisfactory appearance.

"I might add that the black plastic keyboard bezel on both the I and III can be removed and recoated if necessary (someone got white paint on one of ours), using Martin-Senour Vinyl Color Spray #7977, Jet Black. Note that is Jet black, not Gloss black.

Before trying this on your TRS-80, you might want to work up a good spraying technique (slow and steady) on some scrap plastic or whatever. If you try the above solution, or have others, please let us know.

CopyArt Word/Graphics Processor

According to the ads, *CopyArt* provides "the new dimension in word processing," which is graphics; you can put words and pictures on the same screen or page (Figure 3). That is, if you have a Model I or III TRS-80, 48K of memory, and at least one disk. And *CopyArt*, which is $149.95 from Simutek Computer Products Inc. (4877 E. Speedway, Tucson, AZ 85712).

CopyArt combines a word processor very much like Radio Shack's *Scripsit*, a graphics mode for using the cursor like a pen, drawing lines with the four directional arrows (similar to Etch-A-Sketch); a second graphics mode that

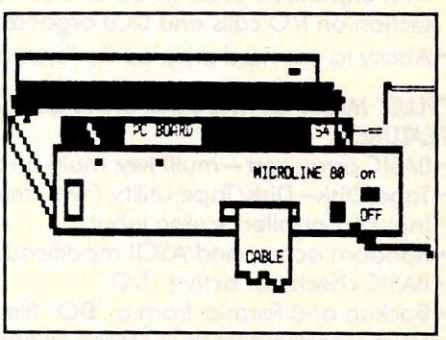


Figure 3. This partial illustration from the CopyArt *manual, showing how to set up an Okidata Microline printer, was created with* CopyArt.

creates large-size letters and numbers; and extensive printout capabilities. *CopyArt* was written with a special version of Simutek's ZBasic compiler, which is advertised as "the world's fastest TRS-80 Basic compiler," and which will be reviewed here at a later date.

TRS-80® COMPUTERS

PURE RADIO SHACK EQUIPMENT

BUY BY DIRECT-MAIL

1-800-841-0860

CONVENIENT ORDER ENTRY

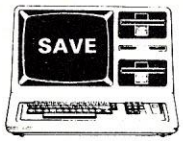
MICRO MANAGEMENT SYSTEMS INC.

TRS-80 COLOR COMPUTER

DISCOUNT PRICED FROM **CALL**

BUY DIRECT 26-3004

TRS-80 MODEL III COMPUTER



DISCOUNT PRICES FROM **$588**

BUY DIRECT 26-1061

TRS-80 MODEL 16 COMPUTER

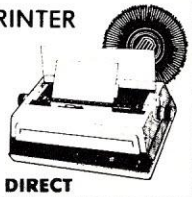
DISCOUNT PRICED FROM **$4098**

BUY DIRECT 26-6001

FRANKLIN
ACE 1000 COMPUTER
DISCOUNT PRICED FROM **$CALL**

SMITH CORONA TP-I DAISY WHEEL PRINTER

DISCOUNT PRICED FROM **$559**



BUY DIRECT

ATARI
HOME COMPUTERS
DISCOUNT PRICED FROM **$629**

TRS-80 MODEL II COMPUTER

DISCOUNT PRICED FROM **CALL**

BUY DIRECT 26-4002

TRS-80 I/III **HARD DRIVES** **$1988** 26-1130

commodore
TEXAS INSTRUMENT
CALL FOR PRICES

TRS-80 PRINTERS — MFG BY RADIO SHACK

DWP-410	$1287.00
DMP-100	$339.00
DMP-200	$679.00
DMP-400	$1015.00
DMP-500	$1525.00

PLEASE WRITE US FOR FREE

- COPY OF OUR CUSTOMER DISCOUNT PRICE LIST UPON REQUEST
- COPY OF MANUFACTURERS WARRANTY UPON REQUEST

OKIDATA EPSON

MICRO MANAGEMENT SYSTEMS INC.

PARCEL DIVISION
DEPT. NO. 3
2803 THOMASVILLE RD. EAST
CAIRO, GA. 31728

GA. INFO **912-377-7120**

TM - TANDY CORPORATION

TRS-80 SOFTWARE
VISICALC, PROFILE, SCRIPSIT & MORE
SAVE MONEY

PRICES AND PRODUCTS SUBJECT TO CHANGE WITHOUT NOTICE. ORDERS SUBJECT TO VERIFICATION AND ACCEPTANCE.

CIRCLE 206 ON READER SERVICE CARD

CopyArt Word Processing

If you have used *Scripsit*, *CopyArt's* word processing capabilities will be very familiar. Some are just about the same, many are new or improved, and only a couple are not quite as good as their *Scripsit* counterparts.

As in *Scripsit,* you use CN=Y for centering, JU=Y for justifying text, LM=5 for left margin at 5, RM=65 for right margin at 65, HD=2 for using the next two lines as headings, PG=10 for starting page numbers on page 10, etc. As in *Scripsit*, you can scroll text (roll the screen up or down the text), move to the top or bottom of text (or to the left or right side of text) using combinations of arrow keys and the shift key, and do global search and replace.

Moving text around is simpler: you just put any text to be moved into a buffer, move the cursor to a new position, and unload the buffer, which places the text in the new position. With the down-arrow, you can move down a screenful at a time, instead of just a line at a time.

To emphasize text, you can simply put SE=Y in the format line (for single emphasis), which double-prints a line and thus makes it darker, or use DE=Y (for double emphasis), which will quadruple-print a line and make it extra dark. To underline text, simply put a ± at the beginning and end of phrases you want underlined.

Two of the best *CopyArt* word processing features are for deleting or inserting characters, and operate more as they do in commercial word processors. Press D, and everything to the right of the cursor moves to the left and disappears, as though swallowed up by the cursor. Press I, and blank spaces pour from the right side of the cursor.

A Directory feature calls up a menu allowing you to get a listing of all the various files on as many as four disk drives, or find out how much space you have left on a diskette.

Hitting the H key calls up help: four pages of display listing the various commands for word processing and printer format, plus some tips. As the manual puts it, "To help you remember the various commands we've included a reference cards." On the screen, that is. Fine, but I would still like a separate card, rather than having to call Help every time I need a simple assist. For me, the lack of a reference card is the only serious problem with *CopyArt*. The index to the 104-page manual is quite good, but using a manual to look up commands takes too much time.

The only *CopyArt* commands that seem to work better in *Scripsit* are two of the simplest: cursor movements left and right, which don't operate as smoothly. Generally speaking, *Scripsit* seems more professional and tidier in operation than *CopyArt*.

CopyArt Line Graphics

Hit the break key and then G, and you are into graphics mode. Now you can use the cursor like a pen (or an eraser), drawing lines (or deleting them). Hit D, and as you move the cursor with the arrow keys, it leaves a trail. Use E to get into erase mode. By switching back and forth from D to E, you create graphics. To move the cursor around without drawing or erasing anything, use M. To speed up the cursor, hit F. That's all there is to the draw-a-line graphics, but you can do a great deal with these four commands.

CopyArt Character Graphics

Hit @ and Y, and you can create big graphic characters automatically, for headlines or banners or whatever you need. The *CopyArt* disk includes a basic set of characters, including the alphabet and numerals, which you can display and print out in various sizes.

After you hit Y, you type in a letter, word or phrase at the bottom of the screen. You specify the height and width of the characters, whether you want them printed horizontally or vertically, and in black on white or inverted (white on black).

These characters can be printed out quite large, especially vertically, where you can print fairly long banners. If you have a printer—such as the Okidata Microline or Epson—that supports the TRS-80 graphics character set, then your banners will be printed with letters of solid black.

On other printers, *CopyArt* uses "pseudo-graphics," by printing, instead of a solid black rectangle (which is equivalent to a white rectangle on the screen), a # overprinted by a 0.

Although at this moment I have three printers on hand, not one of them can print a graphics block. So I had to use pseudo-graphics to see what *CopyArt* can do. In the first example (Figure 4), I put a row of pigeonholes below *Creative's* address, with the first line printed normally, the second with single emphasis (printed twice), and the third using double emphasis (printed four times) and underlined. Although the four boxes were exactly the same size in the original, the printout is a pseudo-graphics approximation, with two sizes of boxes.

The second example (Figure 5) shows

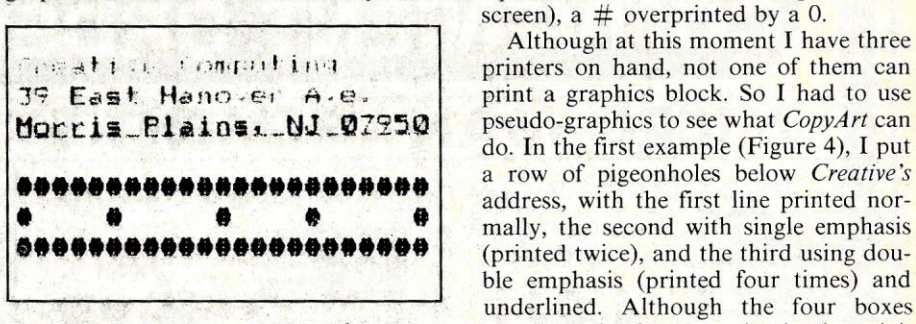


Figure 4. CopyArt *can print with varying degrees of emphasis, underline, and can approximate graphics blocks with 0 over #.*

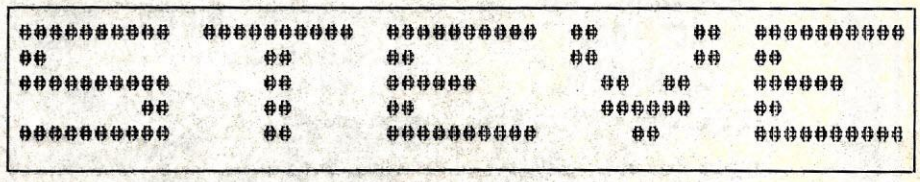


Figure 5. Using pseudo-graphics, CopyArt *can print a good approximation of solid letters.*

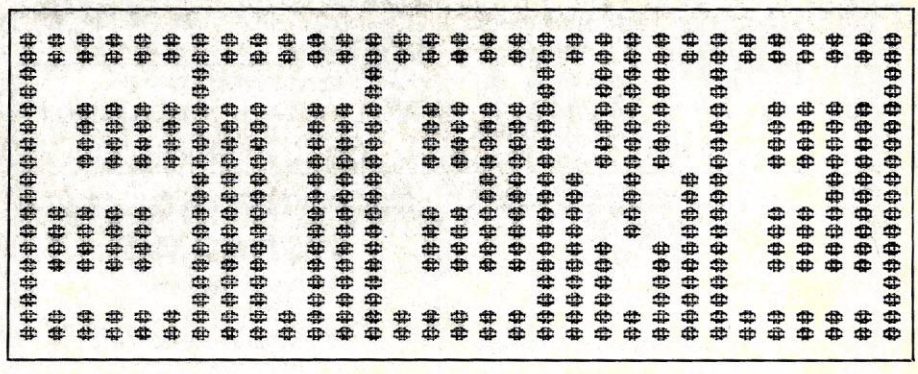


Figure 6. These inverted characters were originally printed vertically with CopyArt.

my first name printed horizontally with small pseudo-graphic characters. The third example (Figure 6), shown horizontally, was originally printed vertically and inversely.

Actually, in that last example, three sets of the name were printed vertically. You can put a word on the screen, then move it over to the right using the insert command to insert blanks, then put another word on the screen, push that into the middle, and add a third word alongside. Incidentally, as the manual notes, the *CopyArt* graphic characters are meant to be used as a framework; you can use the graphics mode to change the basic letters into almost any style you want. "For example, once you have the characters on the screen, you might patch them so they look a little more like Old English type.

Advanced CopyArt

The imaginative manual has a section on some fancy features, such as killing the linefeed for creating new characters with overstrikes, turning off printing so as to print only a portion of a document, using *CopyArt* as an editor, and, if your printer uses special control codes, inserting them directly into text.

When you want to use a control code, you hit @ and C. A message appears at the bottom of the screen:

Cntrl codes?

At which point you simply enter the code. The Cetnronics 737, for example, will start underlining if it is given control code 14. So you type 14, and hit the enter key. Depending on the printer and the code, a character (sometimes a rather strange one not in the regular set) may or may not appear on the screen. It won't be printed out, but will affect the text following it.

```
10 CLS: DIM N(12)
13 FOR X=1 TO 12: READ N(X): NEXT
15 FOR X=0 TO 6: READ D$(X): NEXT
20 INPUT "ENTER MONTH,DAY,YEAR (MM,DD,YY) ";M,D,Y
25 Y1=Y
27 IF Y/4=INT(Y/4) THEN 29 ELSE Y=Y-1: GOTO 27
29 Y=Y/4
30 T=Y+Y1+N(M)+D
32 T1=FIX(T/7): T2=T-(T1*7): IF Y1=00 THEN 50
40 IF Y1/4=INT(Y1/4) AND M=1 THEN T2=T2-1 ELSE
   IF Y1/4=INT(Y1/4) AND M=2 THEN T2=T2-1
50 REM CHANGE THIS LINE FOR 1800'S AND 2000'S
60 PRINT "THE DAY IS: "; D$(T2);".": PRINT
70 T=0: GOTO 20
100 DATA 1,4,4,0,2,5,0,3,6,1,4,6
110 DATA SAT,SUN,MON,TUE,WED,THU,FRI
```

That's most of the *CopyArt* features, which are many and varied, and which you can take days or weeks exploring before you find out all the program can do. (It can simulate a page up to 255 characters wide, for one thing.) If the price seems high, consider that Radio Shack's *Scripsit* alone is $99.95; for an extra $50 you get a word processor with many features not found in *Scripsit*, plus a graphics generator with a great many fascinating capabilities. If you want to combine words and pictures, *CopyArt* provides what may well be the only way to do it directly.

Short Program #35: Calendar

Max Seim of Stillwater, MN wrote to say he "recently picked up the latest issue of *Omni* magazine and quickly flipped to my favorite section: Games."

"I was very interested in the unique mathematical way they showed to determine the day of any given date. I decided to use this method to produce what I think is the shortest Basic program ever written that does it.

"*Note:* The data are important and must be correct. These twelve numbers are the key numbers for each month used in the formula in lines 29-32. That's the complete listing . . .all nine lines of it!"

The program as it sits will determine the day during the 1900's only. Line 50 must be changed for the 1800's and 2000's:

For the 1800's: 50 T2=T2+2

For the 2000's: 50 T2=T2-1

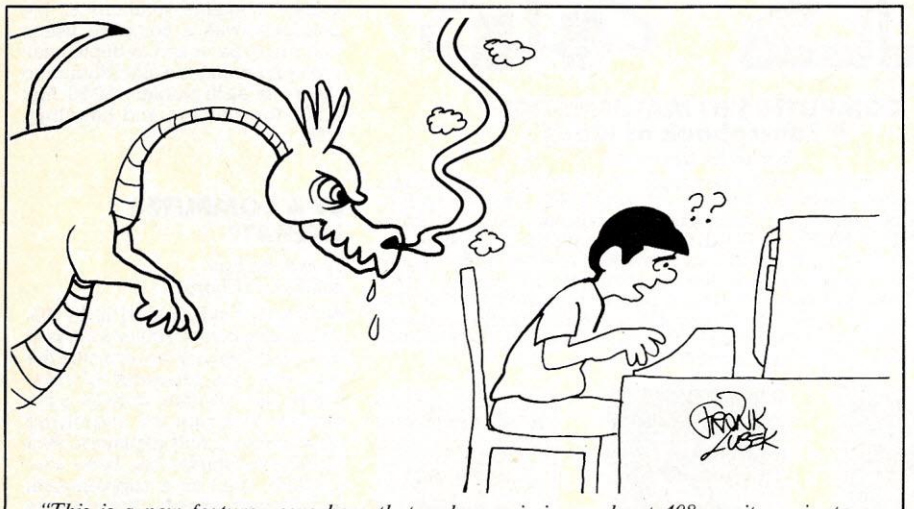
"The program could be easily modified to make these adjustments automatically. Simply input the year as four digits instead of two."

"1900 and 1800, although divisible by four, are not leap years. The program allows for this in the last part of line 32. Years such as 2000 and 4000 are leap years because they are divisible by 400. If you wish to input the year 2000, make sure the last part of line 32 is removed. The last part of line 32 simply jumps over the leap-year determiner if you input 00 for the year.

"If you have any questions, see pages 152-3 of the November 1981 *Omni* magazine."

Max's original program (which of course he submitted some time ago) did contain only nine lines, but I stretched it out a little to make it more readable and to fit this column.

The calendar item Max refers to in *Omni* is called "You too can be an idiot savant," and tells how, by memorizing a method and certain numbers, including those in DATA line 100, you can amaze people by giving the day for any particular date, with just a few moments of mental calculation. The method is fairly simple, but you'd have to use it quite often to be able to remember it for any length of time. □



"This is a new feature—says here that a dragon is in quadrant 408—wait a minute—there is no quadrant 408!"

WELCOME TO THE CREATIVE

A FINE SELECTION OF BOOKS ON

COMPUTERS FOR KIDS

By Sally Greenwood Larsen

Computers for Kids is written for the elementary-age child who is fascinated by computers but put off by the reading level of most programming books. Published in four editions (TRS-80, Apple, Atari and Sinclair ZX81), this delightful book features large, easy-to-read text, loads of illustrations, and complete instructions. *Computers for Kids* tells how to write programs that print, do calculations and draw pictures. It also explains how to save and load programs, write flow charts and use Basic language. A special section offers guidance and tips for adults who are learning about computers with their children. Softbound, 8½" x 11", illustrated. Specify edition: Apple, Atari, TRS-80 or Sinclair ZX81. $4.95. Add $1.00 for postage and handling. **#12S Sinclair, #12G Apple, #12H TRS-80, #12J Atari**

BASIC COMPUTER GAMES

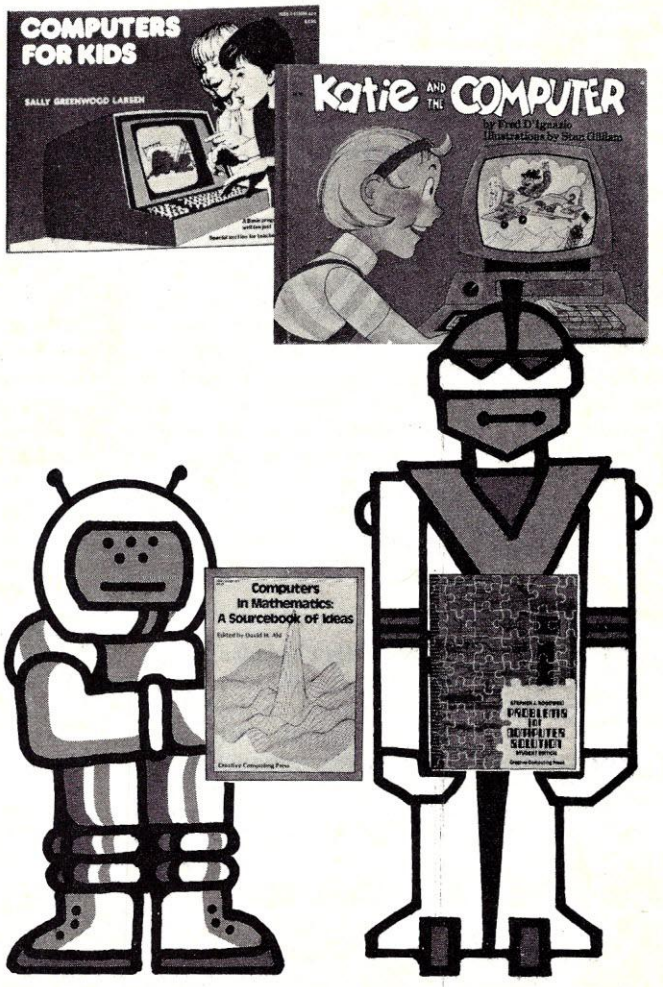
Edited by David Ahl, illustrated by George Beker

Basic Computer Games is a complete anthology of 101 favorite games and simulations, each complete with sample runs, program listings and description. All games run in standard Microsoft Basic and are easy to use with any computer. There are games just for fun, games to help you develop logic strategies, games that teach environmental solutions, games that can be played alone or with a group. Large format paperbound, 200 pages. $7.95. Add $2.00 for postage and handling. **#6C**

MORE BASIC COMPUTER GAMES

Edited by David Ahl, illustrated by George Beker

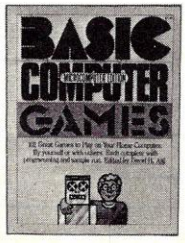
In this sequel to *Basic Computer Games* there are 84 new games to challenge you. All are complete with program listings, sample runs and descriptions. All run in Microsoft Basic and are easy to use with any computer. A Basic conversion table is included. Talk to Eliza the psychologist, evade a man-eating rabbit, crack a safe, tame a wild horse, become a millionaire, hunt a wumpus, and much more. Large format paperbound, 200 pages. $7.95. Add $2.00 for postage and handling. **#6C2**

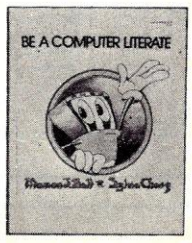


COMPUTERS IN MATHEMATICS: A Sourcebook of Ideas

Edited by David Ahl

This best-selling book contains scores of pragmatic, ready-to-use, classroom-tested ideas in dozens of different areas. Probability: how many packs of gum to get a complete set of baseball cards? Problem solving: SEND + MORE = MONEY. Approximations: calculating—by inscribed polygons. Binary counting, regression analysis, proof of geometric theorems, drill and practice programs, art and graphing programs. Complete program listings and sample runs are included. The book also includes a section of over 250 problems, puzzles and programming ideas. Softbound 8½ x 11", 224 pages, illustrated. $15.95. Add $2.00 for postage and handling. **#12D**





KATIE AND THE COMPUTER

By Fred D'Ignazio and Stan Gilliam

In this delightful full-color adventure, Katie "falls" into the imaginary land of Cybernia inside her daddy's home computer. Her journey parallels the path of a programming command through a computer. While the book is aimed at children 4 to 10, parents can use the supplemental information provided to relate the story to actual computer operation. *Infosystems* calls this book "entertaining and educational." Hard-bound, full-color throughout, 8½" x 11", **$8.95**. Add $1.50 for postage and handling. **#12A**

PROBLEMS FOR COMPUTER SOLUTION

By Stephen Rogowski

Here are 90 intriguing computer problems—most consisting of several parts—that will provide hours of fascinating solution-seeking. Each problem is clearly presented and thoroughly discussed, with references to standard math texts. Problems cover 11 areas: arithmetic, geometry, trigonometry, number theory, probability, statistics, calculus and science, plus three classic unsolved problems for student investigation. Student edition, 8½" x 11", 106 pages, including seven appendices. $4.95. Add $2.00 for postage and handling. **#9Z**

Teacher's edition, 8½" x 11", 182 pages. Contains solutions to the problems, with a complete listing and run in Basic and in-depth analyses explaining the algorithms and theory for each problem. $9.95. Add $2.00 for postage and handling. **#9Y**

BE A COMPUTER LITERATE

By Marion Ball and Sylvia Charp

Written for readers aged 10-16, this informative book discusses kinds of computers, what goes on inside the computer, the language of computers and how they work for us. A sample program for averaging class grades is fully explained. *Be a Computer Literate* has been successfully used as a supplemental text in many schools. The glossary is particularly helpful to young readers who are learning essential computer terminology. Softbound, 8½" x 11", 66 pages. $4.95. Add $1.00 for postage and handling. **#6H**

COMPUTING BOOKSHELF

EVERY ASPECT OF COMPUTING!

BEST OF CREATIVE COMPUTING, VOLUME I

Edited by David Ahl

All the articles, stories, learning activities, games and puzzles that appeared in Volume I of *Creative Computing*. Contents cover computer applications in education and recreation. Over 200 contributors have helped put this book together: from college professor to high school student, U.S. Senator to underground cartoonist, corporation president to science fiction author. A must for everyone concerned with the growth of computers and their increasing role in American society. Large format paperbound, 328 pages. $8.95. Add $2.00 for postage and handling. **#6A**

BEST OF CREATIVE COMPUTING, VOLUME III

Edited by David Ahl and Burchenal Green

Articles, activities, fiction, games, programs, reviews, cartoons and a wealth of information from the 1977 issues of *Creative Computing*. Includes features on technology, public access, educational use of computers, medical applications and computer music. Also reviews of calculators, games, equipment, software and books. 96 pages are devoted to puzzles, programs, problems and games. Large format paperbound, 336 pages. $8.95. Add $2.00 for postage and handling. **#12C**

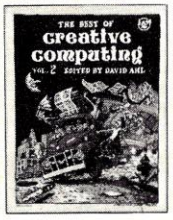
THE COLOSSAL COMPUTER CARTOON BOOK

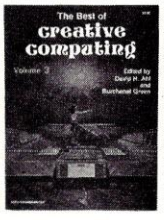
Your program is finally finished. You type RUN. Your computer replies READY. It has just eaten five hours of your life. What do you do? Try to maintain your sense of humor—reach for this anthology of computer humor. Laugh at the original adventures of Edu-Man. Chuckle at cartoons by *Creative Computing* favorites Sandy Dean, Harbaugh, Swan and Johns. Smile sympathetically at the ways others have suggested to get even with the infernal machines. *The Colossal Computer Cartoon Book* contains hundreds of clever cartoons to tickle the funny bone of anyone who has ever loved or hated a computer. $5.95. Add $1.00 for postage and handling. **#6G**

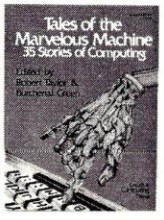
COMPUTER COIN GAMES

By Joe Weisbecker

An informative work that simplifies the concepts of computer circuitry through the use of games that can be played with a few pennies and full-sized playing boards (supplied in the book). With this book children and adults can quickly understand the workings of even the most complex computer circuits. Softbound, 96 pages. $3.95. Add $1.00 for postage and handling. **#10R**







BEST OF CREATIVE COMPUTING, VOLUME II

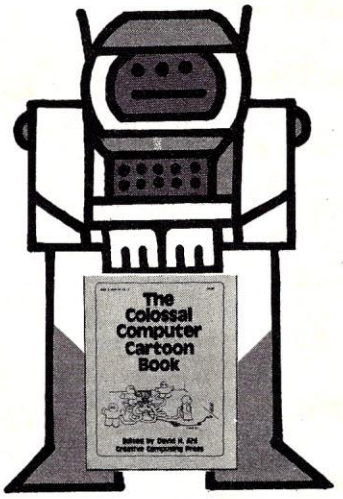
Edited by David Ahl

Here are the best articles, fiction, puzzles, programs, games and reviews from *Creative Computing*'s Volume II. It's a potpourri of information on language programming theory, artificial intelligence, computers in education and computers and the arts. 67 pages are devoted to puzzles, programs and things to do with your computer. Large format paperbound, 336 pages. $8.95. Add $2.00 for postage and handling. **#6B**

TALES OF THE MARVELOUS MACHINE

Edited by Robert Taylor and Burchenal Green

In 35 stories about computers, such authors as Frederick Pohl, Charles Mosmann, M. V. Mathews, Carol Cail and George Chesbro depict a life in which computers affect the way people live, think and relate to each other. Skillfully drawn illustrations augment the stories, giving glimpses of scenes as envisioned by 20 talented artists. Softbound, 8½" x 11", 272 pages. $7.95. Add $1.50 for postage and handling. **#12B**



THE IMPACT OF COMPUTERS ON SOCIETY AND ETHICS: A Bibliography

By Gary M. Abshire

Where is the computer leading us? What are the risks? Will we become masters or slaves of the evolving computer technology? This is a bibliography of works dealing with the ways in which computers are being used in our society, the changes that are taking place in our lives, the social and ethical problems intensified by the improper use of computers, the dangers of computerized society, safeguards and defenses against those dangers, and the responsibilities of computer professionals. 1920 alphabetical entries of books, magazine articles, news items, scholarly papers and other works dealing with the impact of computers on society and ethics. Hardbound, 128 pages. $17.95. Add $2.00 for postage and handling. **#12E**

creative computing
Dept. **HA2T**
39 E. Hanover Avenue, Morris Plains, NJ 07950

Please send books listed below:

Item Number	Quantity	Unit Price	Total Price

Outside U.S.A. add $3.00 per order.

☐ Payment enclosed $_____. NJ residents add 5% sales tax.
☐ Charge my: (Charge and phone orders, $10 minimum.)
☐ American Express ☐ MasterCard ☐ Visa

Card No._____ Exp. Date_____

Signature_____

Mr./Mrs./Ms._____
(please print full name)

Address_____

City/State/Zip_____

CHARGE ORDERS—For your convenience, **PHONE TOLL FREE 800-631-8112.**
(In N.J. only, 201-540-0445.)

creative computing's RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY

TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-7226

ALABAMA

VILLAGE COMPUTERS, 1720 28th Avenue South, Homewood, 35209. (205) 870-8943. Apple, Vector Graphics, Peripherals, Software, Training and Service.

ARIZONA

PHOENIX — HEATHKIT ELECTRONIC CENTER, 2727 W. Indian School Rd. (602) 279-6247. Heath/Zenith Computers, Software, peripherals.

TUCSON — HEATHKIT ELECTRONIC CENTER, 7109 E. Broadway. (602) 885-6773. Heath/Zenith Computers, Software, Peripherals.

SIMUTEK COMPUTER PRODUCTS, 4897 East Speedway, 9881 East Skyview, Tucson, Apple, TRS-80, Xerox, Corvus, Tons of Software, Disk Drive and Printers.

DATA CONCEPTS, PHOENIX—602-242-9961, Tempe—602-968-2122, Scottsdale—602-990-3366. Atari, Apple, Franklin, NEC, Televideo, Commodore, Texas Instruments.

ARKANSAS

ABACUS — 248 Oak St., Conway 72032. (501) 329-9050. Atari, Commodore, Hewlett-Packard. Business/Personal Software, Magazines, Supplies. Free Consultation. Credit cards. We'll ship anywhere.

GAME SHOP — Ft. Smith. Computer games for TRS-80/Apple/Atari. 7 days/week.

CALIFORNIA

D.E.S. DATA EQUIPMENT SUPPLY—8315 Firestone, Downey 90241. (213) 923-9361. VICVILLE: (714) 778-5455. Commodore PET, Commodore 64, Vic 20 specialists. Latest Software, Hardware, Books, Supplies, Peripherals in stock.

OMNI UNLIMITED; 105 S. Los Robles; Pasadena; 91101; 213-795-6664; Commodore, Zenith, Otrona, Victor, Supplies/Peripherals.

ANAHEIM—HEATHKIT ELECTRONIC CENTER, 330 E. Ball Rd. (714) 776-9420. Heath/Zenith Computers, Software, Peripherals.

CAMPBELL—HEATHKIT ELECTRONIC CENTER, 2350 S. Bascom Ave., (408) 377-8920. Heath/Zenith Computers, Software, Peripherals.

EL CERRITO — HEATHKIT ELECTRONIC CENTER, 6000 Potrero Ave., (415) 236-8870. Heath/Zenith Computers, Software, Peripherals.

LA MESA—HEATHKIT ELECTRONIC CENTER, 8363 Center Dr., (714) 461-0110. Heath/Zenith Computers, Software, Peripherals.

LOS ANGELES—HEATHKIT ELECTRONIC CENTER, 2309 S. Flower St., (213) 749-0261. Heath/Zenith Computers, Software, Peripherals.

POMONA — HEATHKIT ELECTRONIC CENTER, 1555 N. Orange Grove Ave., (714) 623-3543. Heath/Zenith Computers, Software, Peripherals.

REDWOOD CITY — HEATHKIT ELECTRONIC CENTER, 2001 Middlefield Rd., (415) 365-8155. Heath/Zenith Computers, Software, Peripherals.

SACRAMENTO—HEATHKIT ELECTRONIC CENTER, 1860 Fulton Ave., (916) 486-1575. Heath/Zenith Computers, Software, Peripherals.

WOODLAND HILLS—HEATHKIT ELECTRONIC CENTER, 22504 Ventura Blvd., (213) 883-0531. Heath/Zenith Computers, Software, Peripherals.

VANGUARD DATA SYSTEMS, 8696 South Atlantic Avenue, South Gate, 90280, 213-564-6402, Mon-Sat, North Star, Televideo, Atari/CPM Software.

COASTAL COMPUTERS, 986 Monterey, San Luis Obispo 93401 (805) 543-9339. Apple, Osborne, Alpha Micro. Software, Peripherals, Supplies. Full Service Center.

P.C. COMPUTERS, 10166 San Pablo Ave., El Cerrito 94530. (415) 527-6044. Commodore Pet, Vic 20 Specialists. In House Maintenance.

LOTUS CENTURY, Westlake Shopping Center (Inside Mini Mall), Daly City, 94015, 415-992-5230. All Major Computer lines discounted.

BEST COMPUTER STORES, INC. 1122 B Street, Hayward 94541. (415) 537-2983. Apple, Compupro, Gimix, Osborne, Otrona, Panasonic.

BYTE SHOP OF HAYWARD, 1122 B Street, Hayward 94541. (415) 537-2983. Apple, Compupro, Gimix, Osborne, Otrona, Panasonic.

COMPUSALES—16819 South Hawthorne Boulevard, Lawndale 90260. (213) 370-3224. IBM, Victor 9000, Basis 108, Osborne, NEC, Apple.

THE SOFTWARE AFFAIR—10127 East Rosecrans, Bellflower, 90706. (213) 866-5206. Apple/TRS-80/Atari/T.I./Color Computer Software.

COMPUTERLAND—16720 South Hawthorne, Lawndale 90260. (213) 371-4624. IBM, Apple, Commodore, Osborne, Fortune. Software. Service. Computer Enlightenment.

COMPUTER SERVICE CENTER—Floppy disc drive repair S100 Sales/Service. Okidata Service. L.A., California 90038. (213) 851-2226.

PROGRAMS UNLIMITED, 11672 Ventura Blvd, Studio City, 90069. 213-763-3425. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today!

EXPERT TRAINING, SALES AND INSTALLATION. Systems Consulting. 265 Lytton Ave., Palo Alto, CA 94301. (415) 326-8605. Apple, Epson, Xerox, Diablo, etc.

ANAHEIM COMPUTER AND VIDEO, 3016 W. Lincoln Blvd., Anaheim, CA 92801, (714) 995-0224. Atari/O.S.I., Vick Games.

COMPUTER STORE/San Leandro — 701 MacArthur Blvd., San Leandro, CA. 94577, (415) 569-4174. Atari, Altos, S100, Printers. Terminals, software, books, magazines, Supplies.

SOFTWARE PLUS, 6201 "C" Greenback Lane, Citrus Heights, 95610, 916-726-4979, TRS-80 color, model I/III, Apple, Atari, Vic-20, TI, Sinclair.

COLORADO

ALPHA CENTER—12351 W. 64th, Arvada 80004. (303) 421-6361. SUNDAYS! Atari, T.I., Timex, Commodore, Corvus, NEC, Source, Epson, Prowriter. Repairs.

DENVER—HEATHKIT ELECTRONIC CENTER, 5940 W. 38th Ave., (303) 422-3408. Heath/Zenith Computers, Software, Peripherals.

CONNECTICUT

COMPUTERWORKS—1439 Post Rd East, Westport 06880; (203) 255-9096. 12-6 Tues.-Fri., 12-8 Thu., 10-5 Sat.

AVON — HEATHKIT ELECTRONIC CENTER, 395 W. Main St. (Rt. 44), (203) 678-0323. Heath/Zenith Computers, Software, Peripherals.

MULTI-BUSINESS COMPUTER SYSTEMS — 28 Marlborough Street, Portland, 06480, 203-342-2747, Complete Commodore Line, Hewlett-Packard, Northstar, Printers, CRT's.

EAST HARTFORD—Computerifics, 1227 Burnside 06108. (203) 528-9819. Atari, Vector, NEC HW/SW. Apple, Vic SW. Books.

DELAWARE

COMPUTERLAND, ASTRO SHOPPING CENTER, Newark; (302) 738-9656. Authorized Sales/Service—IBM, Apple, Osborne, Software, Peripherals, Training.

FLORIDA

HIALEAH — HEATHKIT ELECTRONIC CENTER, 4705 W. 16th Ave., (305) 823-2280. Heath/Zenith Computers, Software, Peripherals.

JACKSONVILLE — HEATHKIT ELECTRONIC CENTER, 8262 Arlington Expressway. (904) 725-4554. Heath/Zenith Computers, Software, Peripherals.

PLANTATION — HEATHKIT ELECTRONIC CENTER, 7173 W. Broward Blvd., (305) 791-7300. Heath/Zenith Computers, Software, Peripherals.

TAMPA — HEATHKIT ELECTRONIC CENTER, 4109 W. Hillsborough Ave., (813) 886-2541. Heath/Zenith Computers, Software, Peripherals.

PROGRAMS UNLIMITED, 2550 Okeechobee Blvd., West Palm Beach 33409, 305-689-1200. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

SOUTHERN MICRO COMPUTER, 15945 NW 57th Avenue, Miami Lakes 33014, (305) 621-4137, Discount prices on Apple/Sanyo, Miami area's oldest dealer.

NEW WORLD COMPUTERS, De Sota Square, Bradenton, 33505, (813) 748-6494. Sell/Lease, in stock—XEROX, APPLE, COMMODORE, SHARP, ATARI, VECTOR GRAPHICS, OSBORNE, PANASONIC, over 1,000 pieces of software, custom programming, in house repair, HANDS ON EXPERIENCE.

COMPUTER SYSTEM RESOURCES, INC., GAINESVILLE—Butler Plaza (904) 376-4276. Apple, Osborne, Atari, Software, Peripherals, Classes, Service.

GRICE ELECTRONICS, Fort Walton, Panama City, Pensacola, 800-342-4646. (800-874-8398). Apple, Hewlett-Packard, 24 Hour Service.

MICRO COMPUTERS INTERNATIONAL, 1688 and 2420 Coral Way, Miami 33145, 305-856-5166. VIC-20, Atari, Apple, Zenith, Altos, Xerox, Sanyo, NEC, Okidata, Epson. 10 to 25% Discount on all personal computers and software.

ORLANDO—SOFTWARE UNLIMITED, 3216 East Colonial Drive 32803. (305) 894-3304. Discounted programs, accessories, supplies for personal computers.

THE BYTE SHOP OF MIAMI & FT. LAUDERDALE—7873 Byrd Road, Miami 33155 (305) 264-BYTE—2176 W. Oakland Park Blvd., Ft. Lauderdale 33311, (305) 486-BYTE, Apple, Altos, Kapro, Alpha Micro.

COMPUTER TUTOR—1000-23 US Highway 19, Port Richey, 33568 (813) 848-8121 — (813) 847-0296. Apple, Kapro, Northstar, Micromation. Discount Prices.

GEORGIA

ATLANTA — HEATHKIT ELECTRONIC CENTER, 5285 Roswell Rd., (404) 252-4341. Heath/Zenith Computers, Software, Peripherals.

MENTOR TECHNOLOGY, 3957 Pleasantdale Road, Atlanta, 30340, 404-447-6236. Franklin, Atari, Televideo, Sanyo, Altos, C. ITOH Printers Software. CP/M, Apple, IBM.

ILLINOIS

COMPUTERLAND/DOWNERS GROVE — 136 Ogden Ave., Downers Plaza 60515; (312) 964-7762. 10-6 Mon.-Sat., 10-8 Tue., Thurs. IBM, Apple, Atari, Osborne, IBM Personal Computer, Fortune.

FARNSWORTH COMPUTER CENTER — 1891 N. Farnsworth Ave., Aurora 60505; (312) 851-3888. 10-8 Mon.-Fri., 10-5 Sat. Apple, Hewlett-Packard series 80 systems, HP Calculators, IDS Printers.

THE COMPUTER ROOM, 638 North Michigan, Chicago, IL. 60611. (312) 337-6744. Apple, Televideo, Osborne. Business Program Specialists.

COMPUTER JUNCTION—543 S. York Rd., Elmhurst 60126. (312) 530-1125. Strong support on Apple, Atari, Xerox, NEC. Software/Hardware.

VIDEO ETC., 465 Lake Cook Plaza, Deerfield, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, Orland Park (312) 460-8980, Buffalo Grove, (312) 459-6677, strong Hard/Software support for Apple, Atari.

DATA DOMAIN OF SCHAUMBURG, 1612 E. Algonquin Rd., Schaumburg, 60195. (312) 397-8700. 12-9 Mon.-Fri., 10-5 Sat. Apple, Osborne, Alpha Micro, Hewlett-Packard calculators. Largest book and Magazine selection.

COMPUTERS ETC. 2515 West 147th Place, Posen 60469. (South Suburbs of Chicago). Apple, Zenith Hardware/Software/Service. Complete Learning Center.

LOMBARD—COMPLETE COMPUTING—890 E. Roosevelt. (312) 620-0808: Apple, Atari, NEC, Altos, Dynabyte; Software, Peripherals, Classes.

COMPUTERLAND/LAKE COUNTY—Rtes 45 & 60, Mundelein—(312) 949-1300: IBM, Apple, Osborne, Altos, Fortune, Digital: 150 other manufacturers.

NILES—COMPUTERLAND—9511 N. Milwaukee Ave. 60646. (312) 967-1714: Apple, IBM Personal, Cromemco, Fortune, Osborne, Otrona: Software.

COMPUTERLAND/NORTHBROOK—3069 Dundee Road (60062). (312) 272-4703: IBM, Apple, Atari, Osborne, Altos, Vector: Software, Peripherals, Service.

COMPUTERLAND/OAK LAWN—10935 S. Cicero, Oak Lawn 60453; (312) 422-8080; IBM-PC, Apple, Atari, Osborne, Corvus, Dynabyte: Software, Peripherals.

ATARI SERVICE—Computers/Videogames, TRS-80, upgrades by appointment—Electronic Service, Route 150, Mansfield, 61854: (217) 489-3241.

GALESBURG—MIDWEST INFORMATION SYSTEMS. 41 South Cherry 61401. (309) 342-7177. Apple, VIC-20, Peripherals, Software. Open 6 days.

HEATHKIT ELECTRONIC CENTERS—3462-66 W. Devon Ave., Chicago 60645 (312) 679-2270—224 Ogden Avenue, Downer's Grove 60515, (312) 852-1304—Heath/Zenith Computers, Software, Peripherals.

THE SOFTWARE STORE—GLENVIEW—1767 Glenview Road, 60025, (312) 724-7730. Popular Micro Computer Software. Special Orders Specialists.

MAIN STREET COMPUTER—215 North Main, Decatur 62523. (217) 429-5505/1610 Broadway, Mattoon 61938. (217) 234-4404/313 East Monroe, Springfield 62701. (217) 753-8808/123 West Main, Taylorville 62568. (217) 824-4984. Apples, Hewlett-Packard Calculators, large stock of business, personal Software. Repairs.

MICRO COMPUTERS PLUS—349 East Main, Galesburg 61401. (309) 342-9572. All Systems/Home, Business. Classes, Service, Books.

ABC COMPUTER—SKOKIE—3361 Dempster, 60076. (312) 673-3550. Gamemaster, Telecommunication Experts. Business/Personal Computers. Software, Supplies, Service.

ABC COMPUTER—OAK LAWN 60076, 9010 Cicero (312) 423-2800. Gamemaster, Telecommunication experts. Business/Personal Computers. Software, Supplies, Service.

COMPUTERLAND/ARLINGTON HEIGHTS—270 West Rand Road, 60004. (312) 870-7500. Apple, IBM, Altos, Fortune, Xerox, DEC. Peripherals.

ALPINE COMPUTER CENTER—ROCKFORD—2418 S. Alpine, 61108. (815) 229-0200. Apple, Cromemco, Olivetti, OSI, VIC, Corvus, Peripherals.

SYSTEMS SOURCE—131 W. Madison, Chicago 60603—Financial District. Apple, Osborne, Xerox, Altos. Business Support specialists.

INDIANA

GRAHAM ELECTRONICS COMPUTER CENTERS — 133 South Pennsylvania, Indianapolis 46204, (317) 634-8202. Apple, Victor, NEC.

GRAHAM ELECTRONICS COMPUTER CENTERS—96th & North Keystone, Indianapolis, 46204, (317) 844-1255. Apple, Victor, NEC.

GRAHAM ELECTRONICS COMPUTER CENTERS—3433 E. Washington Blvd., Fort Wayne 46801, (219) 423-3422. Apple, Victor, NEC.

IOWA

BEACON MICRO CENTER, 213 Lincoln Way, Ames 50010. (515) 233-4807. Apple, Atari, Nec Computers, Peripherals, Software, Service.

KANSAS

GAME SHOP — Wichita. Computer games for TRS-80/Apple/Atari. 7 days/week.

MISSION—HEATHKIT ELECTRONIC CENTER, 5960 Lamar Avenue; (913) 362-4486 Heath/Zenith Computers, Software, Peripherals, Service.

WICHITA—CUSTOM SYSTEMS DEVELOPMENT—114 Pattie 67211, (316) 262-1415. Ohio Scientific, Altos, SD Systems, CPM Software. Service.

KENTUCKY

LOUISVILLE—HEATHKIT ELECTRONIC CENTER—12401 Shelbyville Road, 40243. (502) 245-7811. Heath/Zenith Computers, Diablo Printers, Software, Peripherals.

LOUISIANA

THE COMPUTER PEOPLE—Apple, NEC, Osborne, Corvus Concept—Seminars, Sales, Service. Houma, Morgan City, Lafayette—1-800-352-5828.

COMPUTERLAND/LOUISIANA—312 St. Charles, New Orleans 70130. (504) 522-2255. IBM, Apple, Osborne, Fortune, Vector. #1 in service.

HEATHKIT ELECTRICAL CENTER #29 — 1900 Veteran's Memorial Boulevard, Kenner. Computers, Software, Books, Courses. CALL NOW!

MARYLAND

COMPUTERS, ETC...13A Allegheny Ave., Towson, 21204. (301) 296-0520; 9330 Georgia Ave., Silver Spring, 20910. (301) 588-3748, 257 West St., Annapolis 21401. (301) 268-6505. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/training.

BALTIMORE—HEATHKIT ELECTRONIC CENTER, 1713 E. Joppa Rd., (301) 661-4446. Heath/Zenith Computers, Software, Peripherals.

ROCKVILLE — HEATHKIT ELECTRONIC CENTER, 5542 Nicholson Lane. (301) 881-5420. Heath/Zenith Computers, Software, Peripherals.

BETHESDA COMPUTERS—8020 Norfolk Ave., Bethesda 20814. (301) 657-1992. Apple Hardware/Software—Sales/Service/Peripherals and Accessories.

OLNEY COMPUTERS, 3414 First Ave., Olney 20832. Discount prices on Atari, NEC, Epson, Okidata, Commodore, Amdek.

BASIK COMPUTERS INC., 515 Firstfield Road, Gaithersburg, 20878, 301-840-0412. All Hardware/Software compatible with Apple, Basis 108, Franklin, IBM, Kay Pro, Eagle, and the new Epson Computers, call for Discount Prices.

MASSACHUSETTS

SCIENCE FANTASY BOOKSTORE — 18 Eliot St., Harvard Sq., Cambridge 02138; (617) 547-5917. 11-6 Monday-Saturday till 8 Thursday. Apple, Atari, IBM and TRS-80 games.

PEABODY — HEATHKIT ELECTRONIC CENTER, 242 Andover St. (617) 531-9330. Heath/Zenith Computers, Software, Peripherals.

WELLESLEY — HEATHKIT ELECTRONIC CENTER, 165 Worchester Ave. (617) 237-1510. Heath/Zenith Computers, Software, Peripherals.

THE GAME SHOP—ACTON, 166 Great Road (01720): (617) 263-0418. N.E.'s largest selection of Game/Recreational Software.

BURLINGTON/SOFT SUPPLY INC.—68 Middlesex Tpk., 01803; (617) 229-6666. Supporting IBM, NEC, Digital, Apple Microcomputers.

HOME ENTERTAINMENT SHOWPLACE—757 Belmont, Brockton, 02401. (617) 588-1643. Atari, Commodore, Peripherals. Game/Business Software. Call now!

BRAINTREE—J.L. HAMMETT. Hammett Place 02184, (617) 848-1000. South Shore Plaza Store (617) 848-1000. Apple, all educational software, books.

MICHIGAN

COMPUTER CENTER — Garden City; (313) 425-2470 & West Bloomfield; (313) 855-4220; Hewlett-Packard Computers/Calculators, Apple, North Star. Large Selection of Software/Hardware.

COMPUTER CONTACT—3017 East Hill, Grand Blanc 48439. (313) 694-3740. Apple, Altos. Software, Peripherals, Service. Business/Education/Personal.

DETROIT—HEATHKIT ELECTRONIC—E. Detroit 48021: 18149 E. Eight Mile (313) 772-0416—Detroit: 18645 W. Eight Mile (313) 535-6480.

COMPUTERLAND—22000 Greater Mack Avenue, St. Clair Shores 48080. (313) 772-6540. Altos, Apple, Atari, DEC, Fortune, IBM, Osborne, Xerox.

MINNESOTA

ABS DATASYSTEMS CORP. — 905 St. Germain, St. Cloud 56301. (612) 253-8734. Ohio Scientific, M/A COM O.S.I., Authorized Distributor.

DIGITAL DESIGNS—ROCHESTER—1137 6th Street N.W. (55901). (507) 282-3222. Altos, Apple, Software, Peripherals. Service and Training.

ST. PAUL—HEATHKIT ELECTRONIC CENTER—1645 White Bear, (612) 778-1211. Heath/Zenith Computers, Software, Peripherals.

MISSISSIPPI

MISSISSIPPI MICROS, Mart 51, 1700 Terry Road, Jackson, 39204, (601) 948-7846, Apple, Commodore, Atari, Cromenco, Sales and Service.

MISSOURI

CENTURY NEXT COMPUTERS — 1001 E. Walnut, Columbia, 65201; 314-875-8613/2120 Missouri Blvd., Jefferson City, 65101; 314-636-6502 — Apple, Osborne, Atari.

COMPUTER MART — 1904-B E. Meadowmere, Springfield, 65804, 417-862-6500. Apple, Commodore, IMS International, Software, complete Computer Bookstore, Business Specialist.

BRIDGETON/ST. LOUIS HEATHKIT ELECTRONIC CENTER—3794 McKelvey Road, 63044—(314) 291-1850: Heath/Zenith Computers: Software, Peripherals, Support.

COMPUTER ANNEX—411 South Campbell, Springfield 65806. (417) 864-7036. Bell & Howell, "Apple," Franklin, Sales, Service, Supplies.

ST. LOUIS—FORSYTHE COMPUTERS—7748 Forsyth Blvd., Clayton 63105. (314) 721-4300. Apple Dealer. Best in sales, Service, support.

MONTANA

THE COMPUTER STORE—BILLINGS—1216 16th Street, 59102. (406) 245-0092: Apple, Commodore, Hewlett-Packard: Software, Perpherals, Service.

NEVADA

HOME COMPUTERS — 1775 E. Tropicana #6, Las Vegas 89109; (702) 798-1022. Mon.-Sat. 10-7 Apple, Atari, Hardware/Software, Books & Service.

NEW HAMPSHIRE

COMPUTER MART OF NEW HAMPSHIRE, 170 Main St., Nashua, 03060. (603) 883-2386. THE Apple Specialists. Full line Hardware/Software. Training Service.

COMPU-CRAFT. 11 Dunbar Street, Keene 03431. (603) 357-3901. Commodore, Altos, Software. Buy right for education/business.

VIDEO STORE—140 Congress, Portsmouth 03801. (603) 431-1211. Osborne and Atari for your business/home. Software. Supplies.

NEW JERSEY

THE COMPUTER UNIVERSE — 155 Route 17S., Paramus 07652; (201) 262-0960. Mon; Wed; Fri., and Sat., 10-6. Tues., and Thurs; 12-9. 23 Rt. 206, Stanhope 07874 (201) 347-7892 Tues. & Thurs. 12-9; Wed., Fri. & Sat. 10-6. Specializing in Apple Computers.

SOFTWARE CITY, PINE BROOK—101 Rt. 46 East, 07058; (201) 575-4574. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

STONEHENGE COMPUTER CORP., 89 Summit Ave., Summit 07901. (201) 277-1020. 10-6 M.-F, 10-5 Sat. Apple, Canon, Wicat. Authorized Dealer. Sales and Service.

COMPUTERLAND, 35 Plaza, Rt. 4 West, Paramus, 07652. (201) 845-9303. Apple, IBM, Vector Graphic, etc. We know small computers.

COMPUTERS, ETC...Plaza 38 Center, Rt. 38, Cherry Hill, 08002. (609) 779-0023. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

SOFTWARE CITY, TEANECK — 161 Cedar Lane, 07666. (201) 692-8298. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

SOFTWARE CITY, GREENBROOK — 60 Route 22 West, 08812. (201) 968-7224. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

ASBURY PARK—HEATHKIT ELECTRONIC CENTER, 1013 State Hwy. 35; (201) 775-1231. Heath/Zenith Computers, Software, Peripherals.

FAIR LAWN — HEATHKIT ELECTRONIC CENTER, 35-07 Broadway (Rt. 4), (201) 791-6935. Heath/Zenith Computers, Software, Peripherals.

COMPUTERLAND OF CHERRY HILL — Pine Tree Plaza, 1442 E. Rt. 70, Cherry Hill 08034. (609) 795-5900. Apple, IBM, Fortune.

SOFTWARE MART — 352 Bloomfield Avenue, Caldwell 07006, 201-228-4949. Software for Apple, Atari, TRS-80, Pet. 10-20% off list.

SOFTWARE CITY/SUMMIT — 3 Beechwood Rd., 07901. (201) 273-7904. Bus/Res/Utility/Home programs for most microcomputers. Up to 20% off List.

WAYNE SOFTWARE, 1459 Route 23, Wayne Tile Center, Wayne 07470, across from Packanack Center. Computers. Programs. Books. Peripherals. Discount Prices. 201-628-7318.

SOFTWARE CITY/FAIRVIEW—251 Broad Ave., 07022. (201) 943-9444. Bus/Rec/Utility/Home Programs for most Microcomputers. Up to 20% off list.

SOFTWARE ASYLUM, INC. — Rt. 9 South, Box 175, Old Bridge 08857. (201) 536-1401. Huge Selection for Atari — over 400 Programs available. Call for our catalog.

NEW MEXICO

OMEGA COMPUTER CONNECTION, 8244 Menaul N.E., Hoffmantown Shopping Center, Albuquerque, 87110, (505) 298-5400. Commodore VIC 20 and Victor 9000.

NEW YORK

SOFTWARE CITY, MOUNT KISCO — 187 Main St. 10549 914-666-6036. Bus/Rec/Utility/Home Programs for most Microcomputers. Up to 20% off list.

COMPUTER WORLD — 4254 N. Buffalo Rd., Orchard Park, 14127. (716) 662-4141. M-F: 9-9, Sat: 9-5. Atari, Commodore — VIC-20, 64, TI 99/4A. Hardware/Software.

SOFTWARE CITY, PEARL RIVER — 147 Kinderkamack Rd., Montvale 07645. (201) 391-0931. Bus/Rec/Utility/ Home programs for most microcomputers. Up to 20% off list.

AMHERST — HEATHKIT ELECTRONIC CENTER, 3476 Sheridan Drive., (716) 835-3090. Heath/Zenith Computers, Software, Peripherals.

ROCHESTER — HEATHKIT ELECTRONIC CENTER, 937 Jefferson Rd., (716) 424-2560. Heath/Zenith Computers, Software, Peripherals.

N. WHITE PLAINS — HEATHKIT ELECTRONIC CENTER, 7 Reservoir Rd., (914) 761-7690. Heath/Zenith Computers, Software, Peripherals.

ADS OFFICE SYSTEMS, BOX 3210, Rt. 55, Poughkeepsie 12603. (914) 473-9400. User support: Apple, Hewlett-Packard, IBM-PC.

PROGRAMS UNLIMITED, 20A Jericho Turnpike, Jericho, Long Island 11753. (516) 333-2266. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

PROGRAMS UNLIMITED, Smith Haven Plaza, (Route 347) Smith Haven, Long Island 11755. (516) 724-4490. Hardware, Software, Peripherals, Books. Talk to the pros today.

PROGRAMS UNLIMITED, 131 Mamaroneck Avenue, White Plains 10601, (914) 761-9283. Hardware, Software, Peripherals, Magazines, Books. Talk to the pros today.

BUSINESS COMPUTING INTERNATIONAL—342 Madison, NYC 10173. (212) 697-9400. Specialization Export: Archives, Wicat, IBM Series I, System 23 Datamaster, Arabic Conversion Packages, All Software.

PROGRAMS UNLIMITED, Rickel's Plaza, Commack, L.I. 11725. Opening Late October.

VIDEO VILLAGE, LONG ISLAND, 5060 A Sunrise Highway, Massapequa Park, 11762. (516) 799-1616. Long Island's Largest Atari Dealer. Great Software/Service. Catalog 25¢.

COMPUTER COTTAGE Inc., Main Road, Mattituck, N.Y. 11952. (516) 266-1084, 24 hours. Featuring Atari Home Computers. Also, TI 99/4A, Commodore, North Star. Authorized Service.

BUFFALO—PERSONAL COMPUTERS, Inc., 3251 Bailey Ave., (716) 832-8800. Osborne, NEC, Atari, Commodore, Wicat. Personal Service.

PROGRAMS UNLIMITED, 5022 East Jericho Turnpike, Commack, 11725, 516-449-2828. Hardware, Software, Peripherals, Magazines, Books. Talk to the Pros today!

UPSTATE COMPUTER SHOP, 1823 Western Avenue, Albany, 12203, 518-456-3019, Commodore, Altos, Victor, Eagle.

UPSTATE COMPUTER SHOP, Commercial Drive/Route 5A, Rd 1 Box 17A, Whitesboro, 13492. 315-768-8151, Apple, Commodore, Altos, Victor. Software/Hardware.

COMPUTER DISCOUNT SERVICES. 448 West 55th St., New York, 10019. 212-757-8698. Timex Sinclair, Atari, Texas Instruments Hardware, Software, Peripherals.

NORTH CAROLINA

GREENSBORO — HEATHKIT ELECTRONIC CENTER, 4620 W. Market Street, (919) 299-5390. Heath/Zenith Computers, Software, Peripherals.

PERSONAL COMPUTER CENTER, 2605 Chapel Hill Boulevard, Durham 27707, 919-493-5466, Raleigh 919-833-2240. Full Line of Apple Hardware/Software for Business, Education & Life.

COMPUTER & VIDEO CENTER — 1902 Clarendon Blvd., New Bern 28560. (919) 638-5030. Vic-20. Northstar, Altos. Specializing in Small Business Systems.

ALPHA-ONE COMPUTER AND CAMERA CENTER. Highpoint 27260. (919) 883-4013. Atari, NEC, Epson Authorized factory Service Center.

OHIO

ABACUS II — 1417 Bernath Pkwy., Toledo 43615; (419) 865-1009. 4751 Monroe St. (419) 471-0082. 10-6, 10-7 Thurs. Apple, Osborne, Adds, NEC, Atari, Epson & IDS Printers.

NORTH COAST COMPUTERS — 626 Dover Center, Bay Village 44140; (216) 835-4345. 10-6 Mon.-Sat., 10-8 Tue., Thur. Apple/Atari/Vector Graphic/Data General.

PROGRAMS UNLIMITED, Golden Gate Plaza, Mayfield Heights, 44124. (216) 449-4030. Hardware, software, peripherals, magazines, books. Talk to the pros today!

MICRO CONCEPTS, 1655 Brittain Road, Akron, 44310, (216) 633-7740. Commodore, Atari, Onyx, Northstar. Full Service dealer, Classes, Custom Programming.

BARNHART STORES — 548 N. Main, Urbana 43078. (513) 653-7257. 8AM-5PM. Atari/Commodore at discount prices.

ELECTRONIC CONNECTION — 424 E. Stroop, Kettering 45429; (513) 294-0222 — Trojan Village Shopping Center, Troy 45373. Atari, Commodore, Timex — Home Computer Specialists.

JERRY'S COMPUTER—The Euclid Arcade #30, Cleveland, 44115, (216) 579-0648 — Authorized North Star, PMC80 dealer — Software — Peripherals.

GRAHAM ELECTRONICS COMPUTER CENTERS — 239 Northland Blvd., Cincinnati 45246, (513) 772-1661. Apple, Victor, NEC.

TOLEDO—U-Compute, 3137 West Central, 43606. 419-473-2439. Software: Timex, Atari, VIC, Apple, IBM. Catalogue Available.

MICRO LOGIC, 2322 Bethel-Maple Road, Hamersville, 45130, 513-735-3047, complete Commodore Line—VIC 20, 64, PET, CBM.

OKLAHOMA

OKLAHOMA CITY — HEATHKIT ELECTRONIC CENTER, 2727 Northwest Expressway. (405) 848-7593. Heath/Zenith Computers, Software, Peripherals.

GAME SHOP — Norman, Stillwater, Oklahoma City, Tulsa. Computer games for TRS-80/Apple/Atari. 7 days/week.

TULSA—ABS COMPUTER CENTER—8518-E East 71st (74133), (918) 252-1604: Atari, Apple, Hewlett-Packard. Software, Peripherals, Training.

SYSTEMS PLUS—3407 South Boulevard, Oklahoma City, 73034. (405) 348-0862. NEC business applications, Atari, VIC-20, Peripherals for IBM.

ENID—Specialty Electronics (405) 233-1632. Atari, Commodore, Texas Instruments. All Software/Business Applications. Open 6 days/week.

OREGON

MICRO COMPUTER SUPPLIES, INC. 3809 Southwest Hall, Beaverton, 97005. (503) 643-0865. Kaycomp-2, Televideo, Xerox, Diablo, Dysan, 3M. Ribbons, Forms, Software.

THE COMPUTER STORE—2015 Northwest Circle Boulevard, Corvallis 97330. (503) 754-0811. Microcomputers/ Peripherals sales and service. Training.

MAIL ORDER—COMPUTEROLA—P.O. Box 13748, Portland, 92713. (503) 239-4315. Atari, VIC-20, Epson, Okidata, Hayes. Software, Peripherals.

BYTE SHOP—625 SW 10th, PORTLAND 97205/3482 SW Cedar Hills Boulevard, BEAVERTON 97005. Apple, IBM, Atari, Osborne, Northstar, Alpha Micro. All Software.

PENNSYLVANIA

CALDWELL COMPUTER CORP., 6720 Rising Sun Ave. Philadelphia 19111. (215) 742-8900. Apple, Commodore, Percom, Northstar Sales/Service.

ERIE COMPUTER CO., 2131 W. 8th St., Erie, 16505. (814) 454-7652. Apple, Commodore, OSI, Xerox, Atari, Huge inventory of Software.

MARKETLINE SYSTEMS INC., 2337 Philmont Avenue, Huntington Valley, 19006, (215) 947-6670. We sell and service MicroComputers and Peripherals. Related books/magazines available.

STARGATE ENTERPRISES, 1111 Fifth Avenue, McKeesport, 15132, (412) 664-1111, hours: 10-6/Monday-Saturday. Authorized Atari dealer with Atari Information Center.

INTEGRATED MICRO COMPUTER SERVICE, 168 Madison, Rochester 15074, (412) 728-6331, authorized dealer of Atari, also selling Televideo, Quasar, Casio.

20/20 COMPUTER, 2020 Hamilton Street, Allentown, 18104, (215) 439-1800. Atari, Apple, Durango, Hewlett-Packard, Data General, Zenith, Televideo. Hardware/Software and Peripherals.

PHILADELPHIA — HEATHKIT ELECTRONIC CENTER, 6318 Roosevelt Blvd. (215) 288-0180. Heath/Zenith Computers, Software, Peripherals.

FRAZER — HEATHKIT ELECTRONIC CENTER, 630 Lancaster Pike, (Rt. 30) (215) 647-5555. Heath/Zenith Computers, Software, Peripherals.

PITTSBURGH — HEATHKIT ELECTRONIC CENTER, 3482 Wm. Penn. Hwy. (412) 824-3564. Heath/Zenith Computers, Software, Peripherals.

COMPUTER FORUM—490 Lancaster Pike, Frazer, 19355. (215) 296-3474. Commodore/Altos/Atari—Hardware/ Software; Epson. Service/Training.

CAMERART, The Court at King of Prussia, King of Prussia, 19406, (215) 337-2020. CAMERART, opening August 1982, Willow Grove Center, 2500 Moreland Road, Willow Grove, 19090, (215) 657-7272. Apple/Texas Instruments. Sales/ Service. For Business Systems Call: (215) 544-8700.

PERSONAL SOFTWARE, 146 Paoli Pike, Paoli, 19355, 215-296-2726. SOFTWARE SPECIALISTS. Custom Programs, Canned Programs and Peripherals.

YORK—COMPUTERS UNLIMITED—2813 E. Prospect Road (17402), (717) 755-1045: Apple, IDS, Vic: Software, Peripherals—Full Service.

THE COMPUTER SOURCE—546 Penn. Ave., West Reading, Pa. 19611, (215) 375-4231. Apple, I.D.S., Sales/Service training.

CLASSIFIED ADVERTISING ORDER FORM

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15 (MINIMUM)
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50

Please refer to heading on first page of this section for ad placement information:

REGULAR: $2.00

OF WORDS _____ # OF INSERTIONS _____

☐ PAYMENT ENCLOSED $ _____

☐ CHARGE: You will be billed monthly. ☐ American Express ☐ Diners ☐ Visa ☐ MasterCharge-Interbank # _____

Account # _____ Exp. Date _____

SIGNATURE _____

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CC183

RHODE ISLAND

WARWICK — HEATHKIT ELECTRONIC CENTER, 558 Greenwich Ave. (401) 738-5150.

SOUTH DAKOTA

COMPUTER SYSTEMS DESIGN—2139 Jackson Blvd., Rapid City, 57701. (605) 341-3662. Apple, Vector Graphics. Custom Software. Restaurant Management!

TENNESSEE

VIDEO VISION STORE, 1645 Downtown West Blvd., Suite #3, #4, Knoxville 37919, 615-690-8800, Atari 400/800, Hardware/Software.

UTAH

MIDVALE —HEATHKIT ELECTRONIC CENTER, 58 East 7200 South. (801) 566-4626. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA

SEATTLE — HEATHKIT ELECTRONIC CENTER, 505 8th Ave., N. (206) 682-2172. Heath/Zenith Computers, Software, Peripherals.

COMPUTERS, ETC...6671 Backlick Rd., Springfield, 22150. (703) 644-5500. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

ALEXANDRIA — HEATHKIT ELECTRONIC CENTER, 6201 Richmond Hwy., (703) 765-5515. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA BEACH — HEATHKIT ELECTRONIC CENTER, 1055 Independence Blvd. (804) 460-0997. Heath/Zenith Computers, Software, Peripherals.

SMALL BUSINESS COMPUTER CENTER, 2929 Virginia Beach Boulevard, Virginia Beach, 23452, 804-340-1977. Apple, Vectorgraphics, Alpha Micro, Commodore VIC 20.

ODYSSEY DATA PRODUCTS—9014 West Broad Street Road, Richmond, 23229. (804) 270-1992. Discount Software-Hardware-Peripherals for Apple, Atari, IBM, TRS-80, Xerox 820. Free Mail Order Catalogue.

WASHINGTON

TUKWILA — HEATHKIT ELECTRONIC CENTER, 15439 53rd Ave., S. (206) 246-5358. Heath/Zenith Computers, Software, Peripherals.

VANCOUVER — HEATHKIT ELECTRONIC CENTER, 516 S.E. Chaklov Dr., (206) 254-4441. Heath/Zenith Computers, Software, Peripherals.

CENTRALIA—DSC COMPANY. 119 West Magnolia 98531. (206) 736-3240. Atari, Commodore, Helix/6809. Services, Consulting, and supplies.

TACOMA—ELECTRONICS SHOWROOM. 2504 Jefferson Avenue, 98402. (206) 272-2329. Atari/VIC Computers. Atari/Apple/TRS-80/Commodore Software. Supplies.

KENT VIDEO AND COMPUTERS—1415 West Meeker 98031. (206) 854-7629. Atari/Kaycomp-2/Commodore. Printers/Modems/Software/Books.

YAKIMA—ROB ROY COMPUTER SHOP—1109 West Yakima Avenue 98902. (509) 575-7704. Northstar, Atari, Software, Peripherals, Magazines.

ELLENSBURG—COMPUTERCRAFT. 115 West 4th 98926. (509) 925-3755. Popular Software/Hardware, Business/Personal. Books/Magazines. Classes. Services.

KIRKLAND—USS ENTERPRISE, 12091 124th Avenue NE 98033. (206) 821-5353. Game Software. Atari, Intellivision, Odyssey, Astrocade, Coleco.

ELECTRONIC SUPER MART—Parkway Plaza 98188, (206) 575-1093/3070 Kitsap Way, Bremerton 98310, (206) 377-3979. Commodore Business Machines. Parts.

WEST VIRGINIA

COMPUTERS PLUS, INC., 300 D Street, South Charleston 25303. (304) 744-2321. Atari, Intertec/Superbrain - Hardware/Software/Service/training.

WISCONSIN

COMPUTERLAND/MADISON—6625 Odana Rd., 53719, (608) 273-2020; 3205 E.Washington, 53704 (608) 241-2100. Apple, Osborne, IBM-PC, Xerox, Hewlett-Packard, Fortune.

COLORTRON COMPUTERS, 2111 Lathrop Ave., Racine, 53405. (414) 637-2003. Apple, Hardware and Software, C. ITOH Printers. Service/Training.

BLUE LAKES COMPUTING—Apple, Fortune, Osborne, Sony—Software, Service, Supplies—Madison (608) 233-6502—Brookfield/Waukesha (414) 785-1788—Maxell Diskettes $1.49, limit 3 per customer with coupon.

MILWAUKEE—COMPCO-7110 W. Fond-Du-Lac, 53218, (414) 438-0610: Apple, Altos, DEC, Osborne, Software, Peripherals, Service, Custom Programming.

MAGIC LANTERN—406 South Park Street, Madison 53715. (608) 251-9112. All Atari Products. 500 Programs in stock.

PHOTOART VISUAL SERVICE—840 North Plankinton, Milwaukee 53203. (414) 271-2270. Bell & Howell, Apple. Educational/Industrial Software.

CREATIVE COMPUTING Readers will respond to your store's listing in the RETAIL ROSTER. Let them know what brands of computer-oriented products you sell; what services you offer. Rates are reasonable . . . success is lasting! Call number listed above for complete information and assistance.

RETAIL ROSTER growth rate is phenomenal because a listing in these columns produces results way out of proportion to cost. If more of your competitors are in here now, doesn't it make sense that your computer store should be too? Call now — make the next issue.

Creative Computing
BUYER'S GUIDE TO PERSONAL COMPUTERS, PERIPHERALS AND ELECTRONIC GAMES
Send $5.00 ($3.95* plus $1.05 postage and handling) to:
Creative Computing
1983 Buyer's Guide
P.O. Box 640, Holmes, PA 19043
*NJ residents add 5% sales tax.
Outside U.S.A. $6.00.

creative computing CLASSIFIED

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** $2.00. **EXPAND-AD®:** $3.00. Ads set in all bold type at 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)—or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, CREATIVE COMPUTING Magazine, 1 Park Avenue, New York, N.Y. 10016. Direct inquiries to Candi Huggins, (212) 725-3927.

SOFTWARE

RETIREMENT PLANNING—$29.95. for Atari. Advanced financial planning, 20922 Paseo Olma, El Toro, CA. 92630.

ONLY $9.95! 100 Easy Input Business and Graphic Programs for all MICRO COMPUTERS using basic. MURPHY & ASSOCIATES, P.O. Box 165, Brandon, Mississippi 39042. (601) 939-9500.

OPTION-INVESTING PROGRAM MAXIMIZES PROFIT. For Apple, TRS-80, IBM, $125. Free Brochure. OPTIONS-80, Box 471-C, Concord, MA 01742.

SINCLAIR ZX81/TS-1000/TRS-80 COLOR COMPUTER PROGRAMS. Wide Selection/High Quality. Catalog $1.00. Zeta Software, Box 3522, Greenville, SC 29608.

SCIENCE FAIR SOFTWARE. Nuclear Reactor Physics, Maxwell's Demon, Time Dilation, Wave-Particle Duality. Free details! Nuclear Software Systems, P.O. Box 1693, Melbourne, Fla. 32901.

DOS HELPER: Easily search, read, modify, rewrite sectors; change DOS commands, error messages; alphabetize catalogs, restore deleted files etc. Only $29.95! THE PROFESSOR, P.O. Box 301, Swanton, Vermont 05488, (514) 747-9130.

FRENCH SOFTWARE—French Software for the Apple Computer: 50 programs entirely in French. Write for FREE Catalog: COMPUTERRE, C.P. 782, St. Laurent, Quebec, Canada, H4L 4W2, (514) 744-1608.

ATARI 400 and 800 upgrade. Full travel extension keyboards and hexadecimal keypad kits, starting at $59.95. Send 50¢ (refundable) for brochure. S/WARE, 1341C Quail Hollow Rd., Harrisburg, PA 17112.

CANADIANS—software for your micro—Apple, Atari, TRS. Only the best, at great prices. Free catalog. Crucis Software Limited, Box 28, Room 21, 10405 Jasper Avenue, Edmonton, Alberta T5J-3S2. U.S. Inquiries.

APPLE EDUCATIONAL SOFTWARE and more. Available nowhere else. Send for free catalog. Indian Head Software, 1002 Indian Head Drive, Snow Hill, N.C. 28580.

VIC-20 SOFTWARE loans for only 10% of cost. Free newsletter and special members discounts on software and hardware (e.g. VIC-20 $189). Membership only $25 by check, VISA, MASTERCARD. SOFTWARE TO GO, Rt. 3, Box 309 A 52, Clinton, TN 37716. (615) 457-5068.

SALE! EDUCATIONAL SOFTWARE: Pre-historic creatures (apple) in-dimension, $24.95, ends 6-1-1983. Dealers welcome. OMEGA STAR INC., P.O. Box 77287, Houston, Texas 77287-7413.

LET YOUR TRS-80 solve any Rubik's Cube; or computerized Master Mind. $15 each or $25 for both programs. David Hutton, 5016 Tartan, Metairie, LA 70003.

ATARI OWNERS—Write me if you are interested in Buying, Selling or Trading Software. David Allbritton, 1879 Ruffner Road, Birmingham, AL 35210. (205) 956-0986.

ATARI SOFTWARE AT DISCOUNT PRICES. Queue's Comprehensive Catalog #10 Free. Queue, 5 Chapel Hill Drive, Fairfield, Connecticut 06432. 1-800-232-2224.

VIC 20 SOFTWARE. Free comprehensive catalog #11 (specify). Queue, 5 Chapel Hill Drive, Fairfield, Connecticut 06432. 1-800-232-2224.

APPLE SOFTWARE AT DISCOUNT PRICES. Queue's free catalog #12 (specify). Queue, 5 Chapel Hill Drive, Fairfield, Connecticut 06432. 1-800-232-2224.

FREE SOFTWARE DIRECTORY. Database manager, mailing list, inventory, accounting, payroll. TRS-80, xerox, IBM-PC. Long SASE. 37¢. Micro Architect, 96 Dothan, Arlington, MA 02174. 617-643-4713.

HARDWARE

IBM BOARD. 64K—½ Megabyte on single board. 64K $395.00, Warranty. Applied Logic, Inc., Box 328, Jamaica, NY 11415. (212) 459-4064.

COLOR COMPUTER HARDWARE and SOFTWARE—send S.A.S.E. for free catalogue. Spectrum Projects, 93-15 86 Drive, Woodhaven, N.Y. 11421.

COMPUTER CONSULTANT

SPACE CITY SOFTWARE——Business System/Software Consulting, Design, Programming, Training, Support. CP/M Specialist. Houston (713) 465-3131.

COMPUTER EQUIPMENT/SUPPLIES

OPTICAL COMMUNICATOR or Data Link receiver, Transmitter; all electrical parts, lenses, instructions, $9.95 each. Both $18.50. $1.00 postage/handling Specify digital or analog. Peko, Box 5476, Sherman Oaks, CA 91413.

ELEPHANT STAMPEDE! ELEPHANT DISKS, 5¼, SS, SD. 1-3 $20.50/Box; 4+ $19.90/Box. Include $2.00 shipping/order. PA residents include 6% sales tax. Send check, money order. SK Products, 134 Laurelwood Dr., Pittsburgh, PA 15237.

ELEPHANT FLOPPY DISKS 5″/8″——(10/Box)—5″ SSSD/soft $21.96, $20.96/2+; SSDD $24.96, $23.96/2+; DSDD $32.49, $30.96/2+. Double density available soft/10/16 sector (specify). 8″ SSSD $24.96, $23.96/2+. Shipping $2/order. Add NJ sales tax if applicable. Write for other prices, info. Direct-to-Tape Recording Company, 14 Station, Haddon Heights, NJ 08035.

EPROM ERASER $49.95. Erases all UV Eproms, 90 day warranty, send orders to: LOGICAL DEVICES INC., 781 W. Oakland Blvd, Ft. Lauderdale, Florida 33311, (305) 776-5870.

APPLE ADC-DAC/16 parallel ports/software ... $129 kit, $189. Assembled. Send $2.15 for details and PC/IC solder practice board. NALAN Computer Specialties, Dept. CC1, 106 Highland Park Lane, Boone, NC 28607.

PLUGS-INS AND ADD-ONS FOR THE IBM PERSONAL COMPUTER. Available in kit form as well as assembled. Build it yourself and save. Free information. Compatible Computer Corp., Dept CC 8, Box 51102, Seattle, WA 98115.

ATARI TYPER—Turn ANY Atari and ANY printer into a typewriter. Disk $19.95. Send check or money order to: K. Rappold, 606 Welsh Pl., Fayetteville, NC 28303.

VISICALC™ Templates for APPLE/ATARI. Financial Pack (24 templates) or Statistical Pack (16 templates). Requires most recent VISICALC™. Price $14.95 per pack. Send check or money order to: R.H. Flast & Co., 6 Peter Cooper Road, New York, NY 10010.

LOWEST PRICES — Atari 400 $275.00/Atari 800 $624.00/Vic-20 $189.00/TI 99-4A $299.00/Timex $88.00. Televideo/NEC/Diablo. HARDWARE/SOFTWARE ANYWARE, 10 Coles Street, Brooklyn, NY 11231. (212) 596-3592.

BUSINESS OPPORTUNITIES

ATTENTION MICRO AND MINI COMPUTER OWNERS. Inventive new method of monitoring investments with your computer, will allow you to set up your own office at home, and bring in greater income. Complete package $45. includes postage/handling. Write for information or send Check/Money order to: C.B.A.S., P.O. Box 163, Ontario, Ohio 44862.

COMPUTER CASH. 101 Exciting, new spare-time home businesses. $4.50. Research. Box 22485CR, Houston, TX 77227.

GROUND FLOOR opportunity in multi-level marketing plan selling national brand home computers and software. For more information write: Computer Logic, P.O. Box 418061, Indianapolis, Ind. 46241.

TELETYPE EQUIPMENT for experienced computer enthusiasts and beginners. Teletype machines, parts, supplies. Catalog: $1.00. ATLANTIC SALES, 3730 Nautilus Ave., Brooklyn, NY 11224. (212) 372-0349.

MAILORDER OPPORTUNITY! Start profitable business without experience or capital. Information free. MAIL ORDER ASSOCIATES, Dept. 585, Montvale, NJ 07645.

COMPUTER CLUB

GOLD COAST COMPUTER RENTAL CLUB — Apple/TRS-80 Software, Firmware, Hardware, Publications. For Free Brochure and details write: Route 1, Bremen, Kentucky, 42325, 502-754-5313.

COMPUTER PUBLICATIONS

HOW TO MAKE MONEY WITH YOUR MICRO. Hard-back, 168 page guide shows how ... Money back guaranteed ... Send $14.95 to RH Publications, P.O. Box 105/C, Sullivan, Illinois 61951. $1 for complete book list.

THE FUTURIST: A journal of forecasts, trends and ideas about the future. Bi-monthly publication exploring tomorrow. $20.00/year—money back guarantee. Write: Dept. C, 4916 St. Elmo Avenue, Bethesda, Maryland 20814.

SINCLAIR ZX81 Newsletter. Exchange programs/ideas. Sample for $1. Jim Schontzler, 1280 Paddington, San Jose, CA 95127.

SOFTWARE AUTHORS WANTED for comprehensive applications software directory. Lowcost national advertising for amateur and professional programmers. All personal computers represented. All programs wanted—games, educational, professional, etc. For information contact, EDITOR GODDARD & CASE PUBLISHERS, INC. 108 Oregon Avenue, Bronxville, NY 10708.

APPLE SOFTWARE DIRECTORY. Over 500 programs with full program descriptions, prices, and ordering information. Available at APPLE dealers, bookstores, or send $4.95 to: The LAMA Software Directory, PO Box 201, Bloomingdale, Illinois 60108. Next deadline for program listings March 31, 1983.

FOR SALE/BARTER

RESISTORS, ¼W½W5% C.F. 3¢ ea., 1% metalfilms. No minimums. Cabinet Assortments. Quantity Discounts. Details from JR INDUSTRIES, 5834-G, Swancreek, Toledo, OH 43614.

ACCESSOR-Game connector and headphone adapter for apple will connect 4 paddles and select speaker, headphones or earphone (included.) Paddle configuration switchable. Gold Sockets, attractive metal case. $35.00 plus $2.50 postage. COD acceptable. (206) 474-3040. Esotronics, 4209 62ndb, Tacoma, WA 98409.

DECWRITER IV. Digital LA34 friction feed wide carriage like new. Use alone or with processor $950. L. Harwood, 1640 Tiburon Blvd. -14, Tiburon, CA 94920.

TRANSISTORS, IC'S, RF Power and LED's. For best buys plus service call TOLL FREE 800-458-6053. PA Call 800-672-7100. MC/VISA honored. Savings, Service, Quality. At B&D we do it better. B&D ENTERPRISES, Box 305, Kane, PA 16735.

DIAMOND NEEDLES and STEREO CARTRIDGES at DISCOUNT PRICES for SHURE, PICKERING, STANTON, EMPIRE, GRADO, AUDIO TECHNICA, ORTOFON, ADC, SONUS AND DYNAVECTOR. Send S.A.S.E., free catalog. LYLE CARTRIDGES, Dept C, Box 69, Brooklyn, NY 11218. For fast COD service TOLL FREE 1-800-221-0906. NY state (212) 871-3303. 9AM-8PM except Sunday.

GAMES

"SPART"——AN EXCITING COMBAT Game for RS extended basic color computers with joysticks. Send $7.95 for Tape to EAG Enterprises, P.O. Box 722, Payson, Arizona 85541.

3 APPLE PROGRAMS FOR $50.00. OIL WELL GAME: Find gushers to become rich. HIGH SCORE: UTILITY to save your scores. CATALOG: Utility to find disks by name and #. Send check or Money Order to: Steven Kahn 134-45 166th Pl.; #3G, Jamaica, NY 11434.

TI/99-4 (A) New Arcade-Quality Game. WALLS AND BRIDGES features action, Hi-Res graphics, and sounds. Uses Joysticks. $19.95 on cassette from TImagination, PO Box 2805, Fairfield, CA 94533.

VIC-20 "HI-RISE" Absorbing new game for Vic owners keyboard or Joystick — colorful game for all ages runs on unexpanded Vic. Dual version tape $8.00. Owen J. Lewery, 98 Orsett St., Oakville, Ontario L6H 2N9, Canada. U.S. Inquiries.

ADVENTURES—Why stumble around in the dark? Become a 'Grand Master Adventurer' with our complete schematic map of the 'COLOSSAL CAVE' as your guide to the 'original' Adventure Game. Send $4.00 (includes postage & handling) to BLUEJACKET SOFTWARE, Dept. CC, P.O. Box 13547, St. Petersburg, FL 33733.

CPM SPACE ADVENTURE GAME; On 8″ — $19.95. K. Kuzel, KCS, 8654 W Berwyn, 3S, Chgo, IL 60656.

IBM PC PRODUCTS

FREE PC INFORMATION, RGB Color Cables, Graphics Software and Booklet—"CHOOSING COLOR MONITORS." J.C. Strick & Associates, 949 S. Southlake Drive, Hollywood, Florida 33019.

TIMEX/SINCLAIR

SINCLAIR ZX81/TS 1000 16K "ALPHA BASE." Command your spacecraft from orbit to "ALPHA BASE" and return. Difficulty levels, impressive, challenging. $8.95. MICROGRAFIX, 306 Double Tree, Lewisville, TX 75067.

COLOR GRAPHICS—package includes 1K RAM (expandable to 6K), Serial I/O interface "Tiny Turtle" Software. MICRO-FLEX, 9760 South Laura, Wichita, Kansas 67233, 316-788-4571.

TRS-80 COLOR COMPUTER PRODUCTS

HIGH QUALITY 16K SOFTWARE. Entertainment, Education, Business. Send SASE for FREE catalog. ILUME DESIGN, 4653 Jeanne-Mance St., Montreal, Quebec, Canada H2V 4J5.

COMPUTER INSTRUCTION

"SCREENWRITER II MADE EASY" Learn to use in one sitting with my "plain English" booklet. Send $5.95 (post paid, check or M.O.) to: J. Mandell, P.O. Box 7063, Charlottesville, VA 22906.

COMPUTER REPAIR, PROGRAMMING, WORD PROCESSING Courses. Exciting "Hands On" training in 4 months, lifetime placement assistance. Systems Technology Institute, 6442 Edgewater Drive, Orlando, FL 32810. (305) 299-6535.

SERVICES

CUSTOM KEYTOPS ENGRAVED for computer keyboards. REPLACEMENT KEYTOPS for word processing software also available. Arkay Engravers, 2073 Newbridge Road, Bellmore, NY 11710. (516) 781-9859.

CLASSIFIED ADVERTISING ORDER FORM

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15 (MINIMUM)
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50

Please refer to heading on first page of this section for ad placement information:

REGULAR: $2.00

OF WORDS _____ # OF INSERTIONS _____

☐ PAYMENT ENCLOSED $_____

☐ CHARGE: You will be billed monthly. ☐ American Express ☐ Diners ☐ Visa ☐ MasterCharge-Interbank # _____

Account # _____ Exp. Date _____

SIGNATURE _____

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

C 183

the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE

ELIZA IS HERE!

AT LAST! A FULL IMPLEMENTATION of the original ELIZA program is now available to run on your microcomputer!

Created at MIT in 1966, ELIZA has become the world's most celebrated artificial intelligence demonstration program. ELIZA is a non-directive psychotherapist who analyzes each statement as you type it in and then responds with her own comment or question — and her remarks are often startlingly appropriate!

Designed to run on a large mainframe, ELIZA has hitherto been unavailable to personal computer users except in greatly stripped down versions lacking the sophistication which made the original program so fascinating.

Now, our new microcomputer version possessing the **FULL** power and range of expression of the original is being offered at the introductory price of only $25. And if you want to find out how she does it (or teach her to do more) we will include the complete **Source Program** for only $20 additional.

Order your copy of ELIZA today and you'll never again wonder how to respond when you hear someone say "Okay, let's see what this computer of yours can actually do!"

ELIZA IS AVAILABLE IN THE FOLLOWING DISK FORMATS:

1. Standard 8 inch single density for all CP/M based computers
   $25 for ELIZA COM-add $20 for Microsoft BASIC-80 Source
2. 5¼ inch CPM for Apple II equipped with Z-80 SoftCard
   $25 for ELIZA COM-add $20 for Microsoft BASIC-80 Source
3. 5¼ inch for 48K Apple II with Applesoft ROM and DOS 3.3
   $25 for Protected File-add $20 for Applesoft Source
4. 5¼ inch for 64K IBM Personal Computer
   $25 for Protected File-add $20 for IBM Disk BASIC Source
5. 5¼ inch for Osborne I Microcomputer
   $25 for Protected File-add $20 for Microsoft BASIC-80 Source

ARTIFICIAL INTELLIGENCE RESEARCH GROUP
921 NORTH LA JOLLA AVENUE – DEPT: R
LOS ANGELES, CALIFORNIA 90046
(213) 656-7368 (213) 654-2214
MC, VISA and CHECKS ACCEPTED

PAPER

FANFOLD BOND PAPER 9½x11
Perforated both sides, snaps out to 8½x11
Two Choices for the Same Price:
15 lb. stock, 3200 sheets, 1-part
20 lb. stock, 2500 sheets, 1-part
23.95

SPECIAL WHITE BOND
Blank, 1-part, 9½x11, 2200 sheets
Letterhead quality paper (20 lb.-25% cotton)
Special strip-offs produce smooth 8½x11 sheet
Selling elsewhere for $60 per 1000 sheets
75.95

HALF-INCH GREENBAR
15 lb. stock, not perforated on sides
8½x11, 3200 sheets, 1-part **23.95**
14⅞x11, 3200 sheets, 1-part **35.95**

Send check with order. Add $6.00 per box for handling and shipping (UPS) within continental US. Calif. residents add 6½% sales tax. Satisfaction guaranteed.

Call or write for free catalog and samples.

BOB'S CHARTS
Computer Paper Dept.
405 E. THIRD, SUITE 206F
LONG BEACH, CA 90802
(213) 435-3492

☆☆ SUPER™ ☆☆ ISA's DATABASE

The only DBMS with all these features:

- ★ PROVEN in one year of test marketing
- ★ TOUGH, reliable file structure
- ★ MENU driven for simplicity and easy use
- ★ ARITHMETIC with stored calculations
- ★ FAST set-up and report formating
- ★ CLEAR user-oriented documentation
- ★ PRINTS totals & subtotals – mail labels
- ★ REFORMATS and merges data files
- ★ MULTI-DISK files: Up to 128K records
- ★ SORTS full disks on up to 40 fields
- ★ PRODUCTION input of repetitive data
- ★ USE existing data files
- ★ COUPLES to word processors
- ★ POSTS transactions to master file
- ★ SEARCH by strings, ranges, comparisons
- ★ DATA COMPRESSION: Over twice as many labels as the other system

For TRS-80* Models I, II, III, & 16 – 250.00
CP/M† – 295.00
CDC
13715 Vanowen St., Dept. CC
Van Nuys, CA. 91405
(213) 873-6621

*T.M. Tandy Corp. †T.M. Digital Research

LIFETIME CERTIFIED DISCS

These high-quality blank discs from Allenbach Industries are guaranteed for a lifetime and have HUB REINFORCED RINGS. Sold in boxes of TEN.

5¼" double density
(Specify soft, 10 or 16 sectors)

Single sided	$30.95
Double sided	35.95
8" single density	34.95
8" double density	40.95

Write for full catalogue of EXCITING GAMES and product lines.

CDE 2463 McCready Ave
Los Angeles, California 90039
(213) 661-2031

– Professional –

REAL ESTATE SOFTWARE

for APPLE, TRS-80 & CPM SYSTEMS

- **PROPERTY MANAGEMENT SYSTEM: $450**
  Tenant History, Late Rent Report, Vacancy Report, Income Report, Auto Late Charge, Returned Checks, Operating Stmt., Building Reports, Utilities Report, Tax Expense Report, Prints Checks, Prints Receipts
- **PROPERTY LISTINGS/COMPARABLES: $325**
  — SCREEN BY —► 22 Items/Listing, 1000 Listing/Disk, Listing Memo Field, Max/Min Price, Max Price/Income, Max Price/Sq Foot, Min Cashflow
- **REAL ESTATE ANALYSIS MODULES: $50/Module**
  Home Purchase, Income Prop Analysis, Property Sales, Construction Cost/Profit, Loan Sales/Purchase, Tax Deferred Exchange, APR Loan Analysis, Loan Amortization, Depreciation/ACRS Analysis, Loan Wrap Analysis
- **WORD PROCESSOR – WORD STAR: $295**

Real Estate Software Company™
At Computer Stores Everywhere or Order COD Direct
Cal Residents add 6½% Sales Tax
(213) 372-9419
Suite E, 1116-8th Street, Manhattan Beach, CA 90266

COMPLETE COMPUTER SYSTEMS FOR UNDER $3000.00

THE NEW CC SYSTEM:
Z80 Processor 4MHz,
64K RAM, 2 Serial Ports,
1 Parallel Port,
2 8" Drives—1.6 MB Storage,
Microline-80 Printer, Adds
Viewpoint Terminal.
Complete Retail Price $37.45
30-Day Special $29.96

Custom Systems Development
114 Pattie
Wichita, KS 67211
(316) 262-1415
Order Yours Today!

MICRO-WINDOW

6502 TRAINING/DEVELOPMENT PROGRAM

HOME • SCHOOL • INDUSTRY

Micro-Window uses HI-RES graphics to display a programming model which shows, in binary, the contents of all 6502 registers as machine language instructions are executed.

Micro-Window completely simulates a microprocessor system with 2K of RAM starting at address zero. Programs can be loaded into the 2K RAM and run while observing their execution in the model, or instructions can be entered one at a time and immediately executed to see their effect on the current state of the model.

Very Easy To Use

APPLE II PLUS
48K DOS 3.3

$120 WINDOW RESEARCH
13452-A N.E. 175th Suite 218
Woodinville, Washington 98072

EDUCATIONAL SOFTWARE

"PLANES" the spatial relations primer for the Apple II.

Displays in high resolution graphics, plain geometric shapes.

Prompts viewer to visualize shapes at different orientations before displaying.

Facility for adding new shapes that requires some calculations.

Promotes abstract reasoning, reading comprehension along with arithmetic exercises.

The Primer includes 200 pre-defined shapes, reference manual and workbook. $39.95.

Requires Apple II+ and 48K with disk drive.

Direct inquiries to:

ITC Technologies Corp.
7100 Boulevard East
#2J
Guttenberg, N.J. 07093
(201) 861-8573.

SPORTS COMPLEX

Football — Baseball— Golf

3 Realistic Sports Simulations— **All 3 for $30**

Football (Integer) has all the action of the real game in text. Play against the computer or your friends.

Baseball (Applesoft or Integer) uses real player stats. Manage the pros (12 teams on disk, 4 on tape) — or build your own favorites.

Golf (Applesoft or Inter) 18 holes of hi-res action for 1 to 4 players.
All fully supported. Specify tape or disk

Apple II or Apple II+

WOLFFWARE, 2004 E. Kensington, Shorewood, WI 53211

WARNING: Frequent use may cause addiction.

GLOSSARYONE

ATTN. APPLEWRITER]I[/ EPSON USERS
INCREASE THE POWER OF YOUR
APPLEWRITER]I[SOFTWARE

Are you having difficulty sending printer control commands to your Epson printer? Would you like to easily turn on and off,

emphasized printing
double strike
double width
compressed width
sub/superscripts
italics
underling

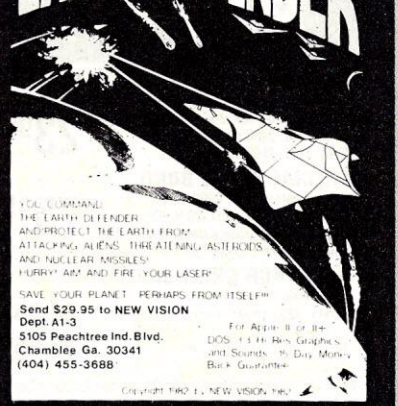
Do all this and more easily & painlessly w/o spending hours reading manuals and memorizing escape codes using GLOSSARYONE and the glossary feature of your Apple-writer]I[software.

For disk and simple instructions send 12.95(plus Ca. taxes if necessary) cash check or money order to,

GLOSSARYONE
#1 Jo-Lin Ctr.
El Sobrante, Ca. 94611

RED ALERT! BATTLE STATIONS! MAN THE

EARTH DEFENDER



YOU COMMAND
THE EARTH DEFENDER
AND PROTECT THE EARTH FROM
ATTACKING ALIENS, THREATENING ASTEROIDS
AND NUCLEAR MISSILES!
HURRY! AIM AND FIRE YOUR LASER!

SAVE YOUR PLANET... PERHAPS FROM ITSELF!™

Send $29.95 to NEW VISION
Dept. A1-3
5105 Peachtree Ind. Blvd.
Chamblee Ga. 30341
(404) 455-3688

For Apple II or II+
DOS 3.3 Hi Res Graphics
and Sounds. 15 Day Money
Back Guarantee

Copyright 1982 by NEW VISION, INC.

BYTE · BITE

The Subscription Magazine for the Sinclair ZX-81/TS-1000 Microcomputers

Games, Educational, Business, Graphics Tutorial, Etc., 1K, 2K, 16K

12 Mo. Issues — 6 Bi-Month CASSETTES
AT LEAST 6 PROGRAMS EACH

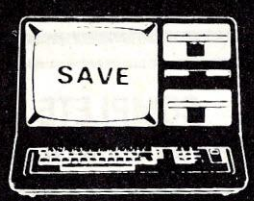
MasterCard VISA

$39.50

Ill. Residents add $2.07 tax
outside USA add $10.00

Ask for operator # 383
24 Hr. Hot Line 800-543-1300

THE S & S COMPANY
388 W. Lake Street, Dept. CC
Addison, IL 60101
(312) 628-8955



RADIO SHACK TRS-80's™

We offer Special Discounts, Free Shipping and a Toll Free Order Number

1-800-531-7466 TOLL FREE

Pan American Electronics

Dept. P.E. - 1117 Conway Avenue
Mission, Texas 78572
(512) 581-2766 Telex 767339

★MICROCOMPUTER★

BUSINESS SOFTWARE

MEDICAL MGMT...
DENTAL MGMT...
INSURANCE AGENT
LEGAL BILLING.....
PROPERTY MGMT..
AND MUCH MORE !

UNIVAIR INTERNATIONAL
10327 Lambert International Airport
ST. LOUIS, MISSOURI U.S.A. 63145

(314) 426-1099

ZX-81 Printer $139.95

- Full 40 columns
- Prints library of regular + inverse alpha-numerics and graphics
- Print in regular and enhanced (double type size) to list program from memory, print text or data from program, print screen
- Includes mini-interface. Can be upgraded to use with high speed storage device, computer networking and other CAI peripherals
- For T/S 1000, ZX-81, ZX-80

Order by phone or mail. Check, money order, VISA or MasterCard (include number and exp. date) Postage $5

CAI Instruments
PO Box 2032, Midland, MI 48640

517-687-7343

SAVE 90%

YES you can save up to 90% on a computer system of your own.

$150.00 buys a 4MHz Z80A with 64KB & a real Front Panel

$200.00 buys a Full Function 24x80 CRT with Keyboard

You can have your own computer and be running Fortran, Basic, Pascal, etc. If you get our

FREE BROCHURE
TODAY

DIGATEK CORPORATION
Suite 7
2723 West Butler Drive
Phoenix AZ 85021

ROLL-YOUR-OWN TECHNOLOGY AND SAVE A BUNDLE

MAXELL FLOPPY DISKS

5¼" SS SD	Qty 10	Qty 100+
	$29.90	CALL

TDK

"LIFETIME GUARANTEE!"

Item	Qty 10	Qty 100+
C30	$ 9.90	$ 89.00
C46	$10.50	$ 95.00
C60	$11.50	$105.00
C90	$13.90	$129.00

UPS shipping on orders up to $70. add $3.50. Over $70. add 5% to total order. Outside UPS zones double above. MC/Visa welcome. Include exp. date and sign.

TAPE PLACE
Box 248
Howard Beach, NY 11414
800-645-6529
(516) 569-5976

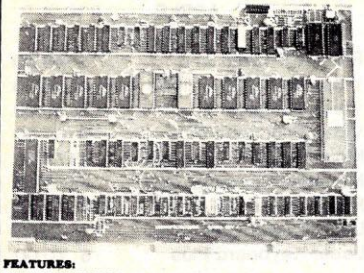
N E W

COMPUTER MART
FORMAT
3″ x 2″

PICTURE YOUR AD HERE!

NEXT CLOSING DATE:
DEC 5

NEW! M-68000
SINGLE BOARD COMPUTER



FEATURES:
16 bit Motorola 68000 CPU operating & 10MHz, 20K bytes of on board fast static RAM, 16K bytes of on board EPROM space, 7 levels of prioritied autovectored interrupts, 2 memory expansion buses (up to 256K), 2 serial communication ports (RS-232C), 16-bit bidirectional parallel port, 6800 peripheral accomodation bus, 5x16-bit counter/timers with vectored interrupts, on board real time clock, software compatible with Motorola MEX68KDM board.

PRICE:

Bare board with documentation	$99.95
MEX68KDM compatible monitor in 2764 EPROM's	$120.00
M68000 CPU & memory map PROM	$115.00
Shipping and handling (Domestic)	$3.00
(Foreign)	$15.00

CALIFORNIA RESIDENTS ADD 6% TAX

EMS Educational Microcomputer Systems (714) 553-0133
P.O. BOX 16115 IRVINE, CA 92713-6115

IBM — XEROX — TRS-80 — CBM
HEWLETT-PACKARD — NORTHSTAR
DEC — HEATH — ZENITH — PMC
OSBORNE — OSI — INTERTEC . . .

WE HAVE

THE CONNECTION

Connect your IBM Selectric®, IBM Electronic, or Olivetti typewriter to any Microcomputer. **UNDER $600**

ESCON Products, Inc.
12919 Alcosta Blvd.
San Ramon, Ca. 94583
(415) 820-1256
(800) 227-2148

SUPER SALE
FOR APPLE II®

DISK DRIVES	$279.95
16K RAM BOARD	$ 49.95

Run Pascal Applesoft/Integer Basic, Etc.

To Order send check or money order To:

EVERTEK
P.O. Box 1311
Provo, Utah 84603
801 373-5389

Please add $2.00 shipping/handling.
In Utah add sales tax.

YOU CAN SAVE $$$

5¼" DISKETTES (Soft or Hard Sector) Box of 10

Single Side/Double Density	$25.25
Double Side/Double Density	$31.25

Altos • North Star • Zenith Data Systems

RIBBONS FOR:

Anadex DP 9500/9501	$14.00
Centronics 700 Series	
Zip Pack (Package of 3)	$ 8.25
Cartridge	$ 8.50
D.E.C. LA-34 (Box of 6)	$30.00
Diablo 630 (Box of 6)	$25.90
Epson MX 70-80	$12.95
NEC Spinwriter (Box of 6)	$24.00
Okidata Microline 80 (Pkg of 3)	$ 8.90
Qume (Boxes of 6)	
(Black)	$19.00
(Red, Green, Blue or Brown)	$16.00
Texas Instruments 810 (Bx of 6)	$19.00

Plus many others · Call for more information

CHECK · MASTER CARD · VISA Accepted
Add **$3.00** for Shipping & Handling:
Illinois Residents Add 6% Tax

ILLINOIS COMPUTER PRODUCTS CO.
P.O. Box 112
Mt. Prospect, IL 60056 **(312) 228-5590**

SINCLAIR ZX80/1 TIME X 1000

I/O Board with our Real Time Clock/Calendar

Time	Month	Date	Year	Day of wk
23:59:59	12	31	99	7

●8 Outputs capable of driving relays ●8 TTL Compatible inputs ●Battery back-up for clock ●All software included ●Feed through Sinclair Bus connector to allow normal expansion ●Output lines expandable through Multiplexing ●5 volt regulator ●90 day warranty.
Future products used with I/O board:
● Touch Tone™ encoder/decoder
● Speech and Sound synthesizer

Model	Description	price
310	I/O port with real time clock*	$49.95
315	PC board and manual of #310	$24.95
320	A to D and D to A converter*	$39.95
325	PC board and manual of #320	$19.95
330	Wireless control system(BSR™)	$54.95
340	Solidstate 25amp sw. modules*	$19.95
350	8 SPDT 5 amp relay board	$69.95
317	Clock IC and crystal (tested)	$12.95
	Shipping and handling	$3.95

* Built and tested Calif. residents add 6% tax
Mail order,check/moneyorders Foreign orders in US money Visa/Mastercard

JK AUDIO
P.O.Box 3295,Escondido, CA 92025 - 0580
Info. (714) 741 - 5132
24 hour order line only **NATL 800-227-1617**
Calif. Res. 800-772-3545 Ext. 367

YOU ARE GOING TO SMILE!

--When you see our Computer 'Source-Book®'...over 2,000 books, software, and accessories for all major brands. A few examples are listed here:

Introduction to Word Processing	$12.95
How to buy the Right business computer	$8.95
Business System Buyers Guide	$ 7.95
Using Micros in Business	$ 9.95
Your Home Computer, an intro guide	$12.95
Computer Dictionary	$15.95
How to computerize your business	$ 7.95
How to make money with micros	$12.95
1001 things to do with your micro	$ 7.95
Computer Graphics Primer	$14.95
Guide to Atari® 400/800 systems	$16.95
Atari™ games and recreations	$12.95
Atari™ Sound and Graphics	$ 9.95
Inside Atari™ DOS	$19.95
80 Time saving programs / TRS-80™	$ 9.95
Intro to TRS-80™ Graphics	$11.95
55 TRS-80™ Color Computer programs	$ 9.95
TRS-80™ Color Computer Graphics	$14.95
Understanding Your Vic-20	$11.95
Computer "Source Book", 2000 items	$2.00

Orders under $25.00 add $2.50 for handling.
MasterCard or Visa accepted on orders over $25.00, send card #; expiry date, bank # on MC
DEALERS INQUIRIES WELCOME

TMC "THE SOURCE" For: Personal Computer Software, Books, Games & Accessories

DEPARTMENT: G-9
1025 Industrial Dr., Bensenville, IL 60106

SAVE 40% ON DISKS

5¼" BASF PRICE/10

1 SIDE/DOUBLE DENSITY	$26.70
2 SIDE/DOUBLE DENSITY	37.10
1 SIDE/80 TRACK QUAD	39.20
2 SIDE/80 TRACK QUAD	52.90

5¼" MEMOREX

1 SIDE/DOUBLE DENSITY	25.60
2 SIDE/DOUBLE DENSITY	36.40
1 SIDE/QUAD 96 PPI	32.50
2 SIDE/QUAD 96 PPI	44.20

5¼" VERBATIM

MD525	1 SIDE/DBL DENS	27.30
MD550	2 SIDE/DBL DENS	44.20
MD577	1 SIDE/77 TRACK	37.10
MD577	2 SIDE/77 TRACK	44.20

ALL 5¼ DISKS SPECIFY SOFT, 10 OR 16 SECTOR
8" DISKS AVAILABLE AT COMPARABLE SAVINGS
ASK ABOUT OUR OTHER SUPPLIES
SHIPPING $2• IN MICH ADD 4% MICH SALES TAX
MONEY ORDER-MC-VISA-COD

CALL (313) 882-8705
J&K SYSTEMS
P.O. BOX 51
EAST DETROIT MI 48021

SINCLAIR/TIMEX
products
Touch-a-Matic™
(212) 757-8698

MODEMS $99.95
easy to use
accurate
direct connect
300 baud

LEX-11 $129.95
Signalman $ 99.95
Call/Write for Catalog

PRINTERS
many brands to choose from!!!
from $375
Starwriter F-10
Epson
Anadex
CALL for prices

Diskettes 6 1/4" $27.50/10

THE LAST ONE™

THE PROGRAM THAT WRITES PROGRAMS

AVAILABLE FOR

CP/M
Apple II Plus
Sharp PC 3201
TRS - 80 MOD II
North Star Advantage

Still Only $600.00

Dealer Inquiries Invited

Send to **KROWN COMPUTING**
1282 Conference Dr., P.O. 66763
Scotts Valley, CA 95066
(408) 335-3133

Make a Living at "21"

A Blackjack Program unique in its ability to teach card counting strategies.

The program will effectively teach card counting strategies with more precision and speed than previously possible. Five proven strategies are taught, each with increasing complexity. Twelve user-alterable rules enable learning strategies specific to any casino in the world. Incorrect player actions are signaled and remembered for subsequent use. Other learning aids are also included, and of course normal casino-style black-jack can be played at any time. Comprehensive manual with 42 Las Vegas Casino game rules $10. Applicable to Software purchase only $80.

CP/M with cursor addressable screen.

Send Check or Money order to:

XANADU ENGINEERING
1653 Minorca, Costa Mesa, CA 92626
(714) 641-0686

CP/M is a trademark of Digital Research.

Genuine **maxell**

DISKETTES

GUARANTEED 100% ERROR FREE

THE GOLD STANDARD

5 1/4 SS/DD (Also Available in 8" & DD)

$29.00 PER BOX (BOXED IN 10)

NO MINIMUM QUAN.

CAPTAIN MEGABYTE

MC VISA C.O.D. IN FLA ADD 5% TAX $2.00 SHIPPING HANDLING ALL ORDERS

WATCH FOR **CAPTAIN MEGABYTES** MONTHLY SPECIALS

HEAD CLEANING KIT
2 Disks Per Box
NO MESSY LIQUID
$17.50 WITH ORDER OF DISKETTES
$21.50 WITHOUT DISKS

WESTWORLD
computer supplies & accessories
4699 S.W. 45th Street
Davie, Florida 33314
305-587-1130

HOT LINE 800-327-1013

DISCOUNT PRICES FOR APPLE II PRODUCTS

Rana 40 Track Drive	$349.00
Videx 80 Column Video Term	$235.00
Videx Enhancer II	$105.00
Videx Function Strips	$ 65.00
Mountain Computer CPS	$177.00
Mountain Computer 32K	$163.00
Prometheus 16K	$ 79.00
Laser Lower Case Plus	$ 45.00
Laser Keyboard Plus	$ 70.00

NEW ENGLAND FRUGALITY AT ITS FINEST.
Yankee Micro, P.O. Box 601, Milford, NH 03055.

COMPUTERWARE
products for

COLOR COMPUTER

SOFTWARE
Color Invaders • Pac Attack • Monitor • Adventure Games • Text Editors • Assemblers • PASCAL • Finance • Color Data Organizer
Starship Chameleon • Berserk
Scribe Word Processor
Address Factory • Home Money Manager
Forth • *FLEX software • Mazerace

HARDWARE
16 K / 32 K / 64 K Memory Expansions
Lower Case Adapter • Cables • Interfaces • Printers

ACCESSORIES
Books • Cassettes • Supplies • Service Manuals

Dealer inquiries invited

*FLEX is a trademark of TSC.

Call or Write:
COMPUTERWARE
Dept. C • Box 668
6809 Specialists Encinitas, CA 92024 • (714) 436-3512

Computerware is a trademark of Computerware.

WANTED
SOFTWARE PROGRAMS FOR THE TIMEX/SINCLAIR 1000
(OR ZX81)

Orbyte Software is looking for original quality software to market. If you have a well written program please send in full instructions and a copy of your cassette. Include your name, address and phone number.

ORBYTE™ SOFTWARE
THE CREATIVE FORCE ™
P.O. Box 948, Dept. CC
Waterbury, CT 06720
203-753-8308

VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
VERSACALC!
T.M.

TUTORIAL
UTILITIES
AND FILE MANAGER
ENHANCEMENTS TO VISICALC®

★ **SORT** any number of rows: labels, values, formulas. You select the extent of the sort.

★ **CONDITIONAL TESTING** to several levels.

★ **PRINT OUT THE LIST OF COMMANDS**

★ **AUTO BATCH UPDATE** - e.g. running year-to-date forms.

★ **MENU—DRIVEN MODULES** for your own application programs.

★ **AUTO-CATALOG** from within Visicalc

★ **AUTO SCREEN FORMAT** saves hundreds of keystrokes

YES! We said, "SORT VISICALC!"

VERSACALC runs within Visicalc.

VERSACALC, is a trademark of Versacalc Enterprises
Visicalc, is a trademark of Visicorp Inc
Apple, Apple II, Applesoft are trademarks of Apple Computers, Inc

Apple	100.00
Commodore	125.00
IBM Personal Computer	150.00
Apple ///	150.00

Dealer Demo Disk Available

Anthro-Digital, Inc.
103 Bartlett Avenue
Pittsfield, MA 01201
413-448-8278

NASHUA:

DISKETTES

GUARANTEED 100% ERROR FREE

Nashua: where quality is a complete commitment

5 1/4 SS/SD (Also Available in 8" & DD)

$19.95 PER BOX WITH HUB RINGS & WRITE PROTECT (BOXED IN 10)

ADD $2.00 PER BOX FOR LESS THAN 10 BOXES

CAPTAIN MEGABYTE

MC VISA C.O.D. IN FLA ADD 5% TAX $2.00 SHIPPING HANDLING ALL ORDERS

WATCH FOR **CAPTAIN MEGABYTES** MONTHLY SPECIALS

CAPTAIN'S SPECIAL
MX-80 CARTRIDGE RIBBONS:
6.00 each
or **$3.75** WITH ORDER OF DISKETTES
Minimum Order 3
We Handle Most Ribbons
AT A 50% DISCOUNT

WESTWORLD
computer supplies & accessories
4699 S.W. 45th Street
Davie, Florida 33314
305-587-1130

HOT LINE 800-327-1013

LEARN

Having trouble learning to use your computer?

Reference manuals don't teach. Most BASIC texts don't cover specific personal computers.

TIS solves these problems with step-by-step books tailored for your machine.

For PET/CBM

Understanding Your PET/CBM	$16.95
Vol 1: Basic Programming	
PET Graphics	$ 6.95

For OSI CIP/C4P

Understanding Your C1P/C4P	$ 9.95
A Workbook of BASIC Exercises	

For VIC

Understanding Your VIC	$13.95
Vol. 1: Basic Programming	

Money Back Guarantee. VISA/MC accepted. All prices include UPS or 1st Class postage.

Dealer inquiries invited.

TIS INC
Total Information Services, Inc.
Box 921, Dept. CC
Los Alamos, NM 87544

ATARI* SOFTWARE ADVENTURES AND GAMES

Each adventure takes up to an hour and is programmed with random variables to change the game every time you play.

THE TALISMAN OF POWER

A search through many obstacles for the four keys of Gremlock. Will you get out alive? 16K - $18.95.

THE GHOST TOWER

Find a Magical Gem in a tower haunted with Orcs, goblins, etc. 16K - $16.95.

SUPER SHAPE BUILDER

A graphics game mainly for children from age five. 'Draw' your own pictures with your joystick, in color. 8K - $9.95.

Send Check or C.O.D. - Discs $4.00 extra. *SATISFACTION GUARANTEED*. Write for further information on our GALAXIAN ADVENTURE and other software. Dealer Inquiries welcome. Continental Adventures, 4975 Brookdale, Bloomfield Hills, MI 48013. (313) 645-2140.

* Indicates Trademark of Atari, Inc.

PC/FORTH

Complete FORTH program development systems for the IBM® Personal Computer. Packages include interpreter/compiler with virtual memory management, line editor, custom screen editor, assembler, decompiler, utilities, file and record access modules, and many demonstration programs. 100 page user manual $100.00

Floating point arithmetic extensions and cross compiler available at additional cost.

Ready to run under PC-DOS or CP/M-86® Standalone version available soon. 64 kbytes RAM and two disk drives recommended. (IBM is a registered trademark of International Business Machines Corp. CP/M is a registered trademark of Digital Research, Inc.)

Laboratory Microsystems
4147 Beethoven Street
Los Angeles, CA 90066
(213) 306-7412

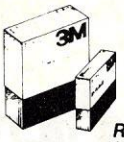
The Quality Leader in
COLOR COMPUTER GAMES
send for our FREE FLYER more coming soon

ARCADE GAMES
Space Raiders
ASTRO BLAST
HAYWIRE
CAVE HUNTER
Cassette (16k) $24.95
Disc. (32k) $29.95

ADVENTURE GAMES
Calixto Island
The Black Sanctum
Cassette (16k) $19.95

Pre paid shipping on domestic orders
Over seas add $3.00
California residents add 6% tax

MARK DATA PRODUCTS
23802 Barquilla • Mission Viejo, CA 92691
(714) 768-1551



Scotch® diskettes
A brand you can trust!
Reliable and dependable!

OUR PRICES HAVE NEVER BEEN LOWER!
By the box or by the case, they're ready for immediate shipment!

Call COLLECT to Order!
(805) 484-8146
QUALITY DATA SUPPLY
P.O. Box 236, Camarillo, CA 93011

Authorized Distributor
Information Processing Products
3M

Sinclair Place

Widest line of Hardware and Software for the Timex Sinclair 1000 and ZX 81 Computers.

Memotech	International Publ.
Thurnal Electronics	Including "Crakit"
QuickSilva	J.P. Gibbons
Haven Hardware	Kopak Creations
Down East Computers	Ksoft
Abacus Electronics	Gladstone
Aerco	M.C. Hoffman

Write, Sinclair Place for Hardware or Software Catalog (Specify) at P.O. Box 2288 Redmond, WA. 98052.

ADVERTISE!

Creative Computer Mart ads really generate sales! $330 each, 6x $315 each, 12x $300 each. Send ad and payment to:

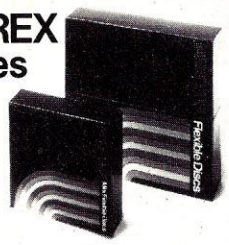
creative computing
CLASSIFIED AD DEPT.
ONE PARK AVENUE
NEW YORK, NY 10016
OR CALL COLLECT:
LOIS PRICE (212) 725-7226

BASF DISKETTES

5¼" SS/DD Softsector	$1.99 each in boxes of 10
5¼" DS/DD Softsector	$2.99 each in boxes of 10
5¼" DS/DD Hardsector	10 Sector $2.99 each in boxes of 10
5¼" DS/DD Hardsector	16 Sector $2.99 each in boxes of 10
8" SS/SD Softsector	$1.99 each in boxes of 10
8" SS/SD Softsector	$2.99 each in boxes of 10
8" DD/DD Softsector	$3.60 each in boxes of 10

Send Check or Money Order to:
SOUTHERN COMPUTER SYSTEMS
630 Main Street
Shelbyville, Kentucky 40065
or call (502) 633-5639

MEMOREX Diskettes

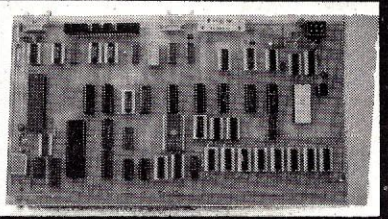


Top-quality Memorex Diskettes from **Tech•Data**, your complete word and data processing supply center. Dealer inquiries invited.

Call Toll Free
1-800-237-8931.
In Florida, call
813-577-2794.

Tech•Data Corporation
3251 Tech Drive North
St. Petersburg, FL 33702

HY-TYPE 1 & 11 • QUME



INTELLIGENT PRINTER INTERFACE
16,000 BYTE BUFFER / STAND ALONE
PARALLEL / SERIAL INPUT (BAUD RATES - 50 to 19,200)
OPTIONS INCLUDE: GRAPHICS • REVERSE PRINT • BOLD PRINT
UNDER-SCORE • REPRINT OF BUFFER
ADJUSTMENT OF LINES PER-INCH
CHARACTERS PER-INCH SELECTION
DOUBLE LINE
CUSTOM OPTIONS ALSO AVAILABLE
A & T FROM $450.00 BARE BOARD FROM $125.00
MASTER CARD & VISA ACCEPTED

WARN ELECTRONICS, LTD.
PO BOX 526 KNIGHTDALE, NC 27545 (919) 266-9411

index to advertisers

Reader Service No.	Advertiser	Page
101	Aardvark Technical Services	185
307	Abacus Data	310
102	ABC Data Products	208
*	Accent Software	88
103	Adventure International	122
104	ALF Products	26
105	Alpha Btye Computer Products	41
109	Alpine Software	193
106	Alternative Software	151
107	Amdek Corporation	31
108	American Small Business Computers	55
110	Anthro Digital	299
111	Apple Computer, Inc.	96-97
112	Appleware, Inc.	240
300	Applied Software Technology	218
113	Archive	229
114	Ark Computing	221
*	Artworx	145
*	Aspen Software	233
117	Automated Simulations	121
198	Automated Simulations	198
116	Avalon Hill Game Company	72
312	B.A.S.F. Computer	149
118	Beagle Brothers Micro Software	174-175
251	Big Five Software	13
*	Bottom Line	207
120	BPI Systems	194
121	Brain Bank	240
122	Broderbund Software	140-141
123	BT Enterprises	182
124	Business Machine Consultants	286
119	Cab-Tek	301
126	California Accessory Warehouse	251
127	Calsoft	239
130	Charles Mann & Associates	254
314	Checkmate	286
131	Chrislin Industries, Inc.	255
132	Chromasette Magazine	288
133	C-Load Magazine	289
134	Collins International Trade Corp.	133
135	Commodore Business Machines	Cov 3
136	CompuServe	197
137	CompuShack	200-201
138	Computer Discount of America	45
139	Computer Discount Products	245
304	The Computer Entrepreneur Publishing Company	291
140	Computer Exchange	52-53
141	Computer Mail Order East/West	124-125
142	Computer Outlet	276-277
143	Computer Plus	263
144	Computertime, Inc	297
145	Computerworld International, Inc.	177
146	Computronics	5
147	Comstar	106
148	Consumer Computer	297
149	Control Data	80-83
150	Corona Data	2
151	Cosmic Computers Unlimited	20
152	Cottage Software	232
153	CPU Shop	243
154	Creativity Unlimited	286
155	Dakin 5	11
156	Datamost	90
157	Datamost	91
170	Datamost	92
158	Datamost	93
159	Dickens Data Systems	26
*	Digital Equipment Corporation	18-19
162	Discount Data Products	264-265
181	Don't Ask Computer Software	74
164	D/Punch Company	285
165	Dresselhaus Computer Products	55
166	Dynacomp	256-257
167	Electronic Specialists, Inc.	299
168	Epson America	76-77
169	Excalibur Technologies Corporation	205
171	First Star Software	71
172	First Star Software	73
173	First Star Software	75
174	Floppy Disk Services	137
196	Franklin Computer	38
175	Gamestar	58
177	Genie Computer Corporation	134-135
176	Gladstone Electronics	294
178	Gold Disk Software	172
179	Great Plains Software	127
180	Happy Hands	45
*	Hayden Software	107
182	Howard Sams Co.	130
183	Huntington Computing	241
184	IBM Corporation	56-57
185	IJG Computer	48
186	IJG Computer	131
*	Infocom	170-171
187	International Software Marketing	164
188	I/O Management	301
189	Jade Computer Products	211-213
310	Kelly's Computing	228
190	Kensington Microware	155
191	Kensington Microware	157
301	Kern Publications	230
192	Leading Edge	9
199	Leading Edge	Cov 4
193	Learning Tools, Inc.	280
194	Lifeboat Associates	190-191
195	Little, Brown and Company	263
197	LNW Research	23
115	LNW Research	60
200	Lyco Computer	313
*	Macmillan Book Club	99-101
201	Meridian	84
202	Micro Business World	304
203	Micro D	27
204	Microhouse	28-29
215	Micro Lab	62
205	Micro Learningware	285
206	Micro Management Systems	335
207	Micro Mountain	227
208	Microsoft	128
210	Micro Systems Software	333
209	Microsystems Exchange	287
211	Microware Distributors, Inc.	235
212	Micro Works	300
213	Milliken Publishing	143
*	Mind Systems	325
214	MTG Technical Sales	223
303	Muse Software	269
216	NEBS Computer Forms	278
217	Nexa Corporation	299
*	NRI Schools	165-167
218	Odesta	70
219	Omega Microware	247
*	Omega Sales	147
221	Omni Resources	189
222	Optimized Systems	63
223	Optomam Consumer Products	45
224	Orange Micro	219
225	Orbyte Software	299
226	Pacific Exchanges	285
226	Pacific Exchanges	286
226	Pacific Exchanges	294
227	Pacific Polytech	232
228	Pan American Electronics	286
229	Parthenon Computer Corporation	152
230	Pathway Software	278
231	Peachtree Software	66-67
232	Penguin Software	44
233	Peripherals Unlimited	283
234	Perry Oil & Gas	263
235	The Personal Computer Show	263
236	Practical Peripherals	Cov 2-1
237	Programmer's Institute	231
238	Protecto Enterprizes	209
239	Psychological Systems	301
240	Quadram Corporation	186
241	Quality Software	139
*	Qume	160
242	Qume	161
243	Radio Shack	163
244	Ranco Software Games	231
246	Reader's Digest Services	105
247	Red Baron	181
298	RH Electronics	108
299	R.H. Electronics	109
249	Royal Software	309
250	Royal Software	114
245	R & R Software	89
305	Savvy	51
308	SFA	286
253	Sierra On-Line, Inc.	37
252	Sierra On-Line, Inc.	69
254	Sierra On-Line, Inc.	159
255	Silicon Valley	85
256	Silicon Valley	87
257	Sirius Software	15
258	SJB Distributors	217
316	Soft Images	111
317	Soft Images	113
259	Soft Images	115
319	Soft Images	117
260	Software City, Inc.	252
261	Software Dimensions	178
263	Softwareland, Inc.	244
264	Software Models	297
265	Software Productions	284
266	Software Publishers	331
267	Software Publishing	34-35
269	Southern California Research	253
*	Spinnaker Software	16-17
270	SSI	79
271	Star Micronics	42
340	Strategic Simulations	169
272	Strategic Simulations	47
274	Strictly Software	225
275	Sublogic	14
276	Synapse Software	103
277	Systems 4 Limited	237
278	Tech Data Corporation	287
352	Tecmar	7
279	Trace	65
280	Unique Software	331
281	Valley Sof'Touch	242
306	Val Par International	25
302	Vectrix Corporation	118
284	Videx	61
285	Voyager Software	278
311	WICO	249
287	Yacaipa Software	297
288	Zorkhan	287

*Write Advertiser Directly.

WHEN WE ANNOUNCED THE COMMODORE 64 FOR $595, OUR COMPETITORS SAID WE COULDN'T DO IT.

THAT'S BECAUSE THEY COULDN'T DO IT.

The reason is that, unlike our competitors, we make our own IC chips. *Plus* all the parts of the computer they go into.

So Commodore can get more advanced computers to market sooner than anybody else. And we can get them there for a lot less money.

WHAT PRICE POWER?

For your $595,* the Commodore 64™ gives you a built-in user memory of 64K. This is hundreds of dollars less than computers of comparable power.

Lest you think that the Commodore 64 is some stripped-down loss leader, a look at its available peripherals and interfaces will quickly convince you otherwise.

SOFTWARE THAT WORKS HARD.

The supply of software for the Commodore 64 will be extensive. And with the optional plug-in Z80 microprocessor, the Commodore 64 can accommodate the enormous amount of software available in CP/M.®

Add in the number of programs available in BASIC and you'll find that there are virtually no applications, from word processing to spreadsheets, that the Commodore 64 can't handle with the greatest of ease.

PERIPHERALS WITH VISION.

The Commodore 64 interfaces with all the peripherals you could want for total personal computing: disk drives, printers and a telephone modem that's about $100, including a free hour's access to some of the more popular computer information services. Including Commodore's own Information Network for users.

RUN YOUR BUSINESS BY DAY.
SAVE THE EARTH BY NIGHT.

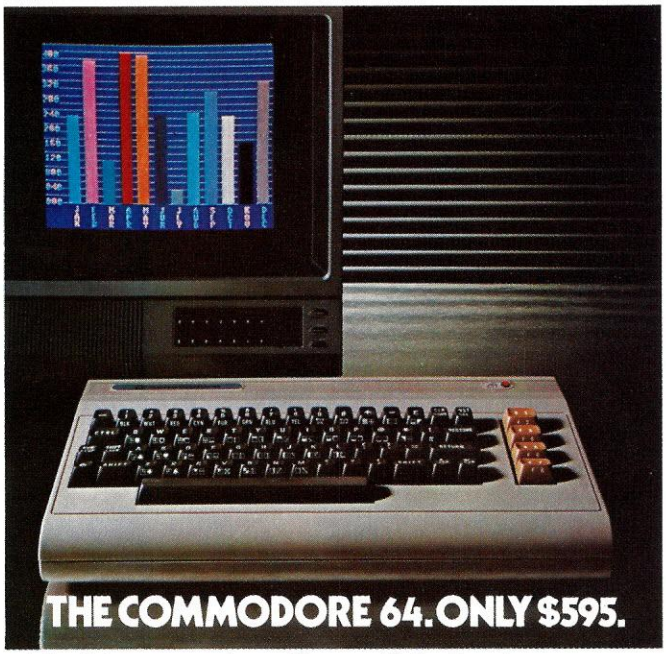
At the end of a business day, the Commodore 64 can go into your briefcase and ride home with you for an evening's fun and games.

Because of its superior video quality (320x200 pixel resolution, 16 available colors and 3D Sprite graphics), the Commodore 64 surpasses the best of the video game machines on the market. Yet, because it's such a powerful computer, it allows you to invent game programs that a game machine will never be able to play; as well as enjoy Commodore's own video game cartridges.

ATTACK, DECAY, SUSTAIN, RELEASE.

If you're a musicologist, you already know what an ADSR (attack, decay, sustain, release) envelope is. If you're not, you can learn this and much more about music with the Commodore 64's music synthesizing features.

It's a full-scale compositional tool. Besides a programmable ADSR envelope generator, it has 3 voices (each with a 9-octave range) and 4 waveforms for truly sophisticated composition and playback—through your home audio system, if you wish. It has sound quality you'll find only on separate, music-only synthesizers. And graphics and storage ability you won't find on any separate synthesizer.



DON'T WAIT.

The predictable effect of advanced technology is that it produces less expensive, more capable products the longer you wait.

If you've been waiting for this to happen to personal computers, your wait is over.

See the Commodore 64 soon at your local Commodore Computer dealer and compare it with the best the competition has to offer.

You can bet that's what the competition will be doing.

Commodore Business Machines
Personal Systems Division
P.O. Box 500, Conshohocken, Pennsylvania 19428

Please send me more information on the Commodore 64™

Name_____ Title_____

Company_____

Address_____

City_____ State_____

Zip_____ Phone_____

commodore COMPUTER

CC-1

Manufacturer's Suggested Retail Price: July 1, 1982. Disk drives and printers are not included in prices. The 64's price may change without notice.
CP/M® is a registered trademark of Digital Research, Inc.

CIRCLE 135 ON READER SERVICE CARD

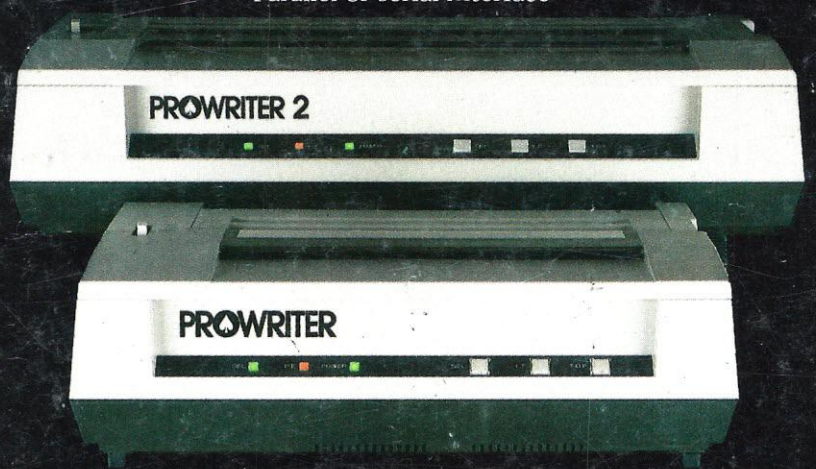
THE LEADING EDGE IN PRINTERS

ONE GREAT LINE. ONE GREAT WARRANTY.

Finally, there's one full family of printers that covers every business or word processing application—all from C. Itoh, a company known for packing more product into less price; and all distributed exclusively by Leading Edge, a company known for searching out and providing that very thing. Which means that one call to one source can get you any printer, any time you need it, for any purpose. All backed by a full years' warranty from Leading Edge. (Try *that* on any other line of printers.)

THE PRO'S.

The Prowriters: business printers—and more. The "more" is a dot-matrix process with more dots. It gives you denser, correspondence quality copy (as opposed to business quality copy, which looks like a bad job of spray-painting).
Prowriter: 120 cps. 80 columns dot matrix compressable to 136. 10" carriage. Parallel or serial interface.
Prowriter 2: Same as Prowriter, except 15" carriage allows full 136 columns in normal print mode. Parallel or serial interface

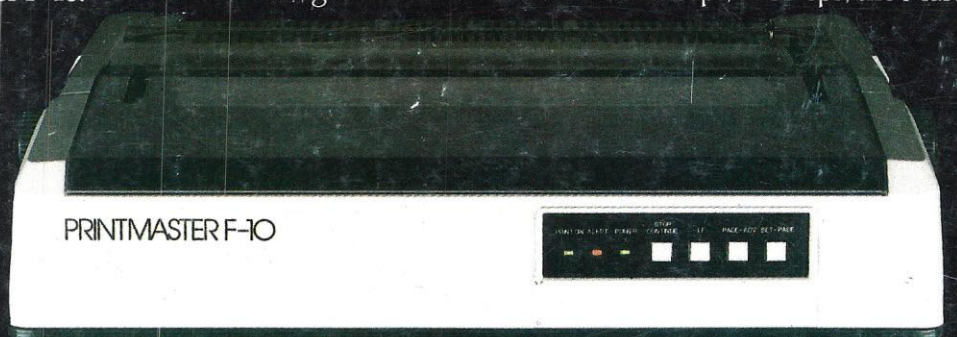


THE STAR.

The Starwriter F-10. In short (or more precisely, in a sleek 6" high, 30-pound unit), it gives you more of just about everything—except bulk and noise—than any other printer in its price range. It's a 40 cps letter-quality daisy-wheel with a bunch of built-in functions to simplify and speed up word processing. It plugs into almost any micro on the market, serial or parallel.

THE MASTER.

The Printmaster F-10. Does all the same good stuff as the Starwriter except, at 55 cps, the Master does it faster.



Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021. Call: toll-free 1-800-343-6833; or, in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 199 ON READER SERVICE CARD